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Redesigning Technology based on Lean Principles to improve productivity: Case Study -Diamond Assortment Unit

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Abstract

Technology is an inevitable component for scaling up any business at a global level. Business's in today's world look forward to the integration of technology in their day- to-day operations. Systems and Processes that are being set up in the organizations aim to maximize the effectiveness and the efficiency. Technology enables the management to take quick decisions that are analyzed as soon as data has been captured. A plethora of standardized software packages are available in the market today. It is a known fact that every organization in the same sector has its unique style set for operating its business. Hence customized Software's are tailor made to focus attention to details and understand the requirement of every organization. The cut throat competitive nature of business compels every organization to increase their profit either by focusing on topline or bottom line. Organizations strive hard to improve both these aspects. To increase the topline, the organizations focus on delivery of high-quality products and services, with a larger variety to the customer. With reference to the aspect of reducing costs, organizations are meticulously working in operational excellence that reduces defects and shortens the lead time. Organizations today need Lean to provide a customer driven philosophy that delivers more by consuming the least. This paper aims at presenting, the aid that technology provides in elimination of operational waste. It encompasses various processes where, a technology enabled lean approach has benefitted the organization to improve their productivity.

Introduction

India Contributes about 29% to the Global Consumption of Gems and Jewelry. India exports around 75% of the worlds cut and polished Diamonds. It provides employment to around 4.6 million people in the country. The availability of l0w cost and high skilled labor makes India an export hub. There are around 300,00 small Indian Organizations that are a part of this sector. With the estimated increase of the Indian Middle Class to 547 million, there is going to be a significant growth in the Gems and Jewelry market of India. (India Brand Equity Foundation, www.ibef.com). SJM Industry is a renowned name in the field of Diamond Assortment. They provide quality diamonds of required specifications on the parameters of cuts, carats, color and clarity to the Jewelry manufacturing industries that are located in the vicinity. SJM Industry realized that there were a lot of processes in their assortment unit that were lowering down their productivity. The organization benchmarked its performance against the industry standard and learnt that the output per employee in one of the departments was substantially low. The assortment unit knew that they had to cater to the emerging demands but lacked the systems to handle it. Further diamonds being a very valuable commodity, SJM required robust systems that would prevent any theft of diamond and would provide a 100 percent secured software that could be utilized during the stock audits. SJM industry already has an existing software that is customized as per their processes.

The research paper focuses on demonstrating a highly effective collaboration where existing Technology is redesigned based on the processes that are guided by the Lean Philosophy. The paper presents various problems faced by the organization that lowered their productivity. Implementing Lean and redesigning the available technology created a significant improvement in the productivity of the assortment unit. The questions that have been addressed in this paper are as follows:

- What were the Lean Tools that had been implemented to improve the productivity?
- How Lean guided the redesigning of the existing software that eventually catered to SJM's need.

The approach that has been used in this case is:

- Identification of Non- Value- Added Activities through Value Stream Mapping. This involved an integrated study of physical processes as well as the software processes
- Creating a Cross Functional Team that would help redesign the existing software
- Implementing Lean Guided technology solutions to improve the productivity
- Sustaining the implemented solution

OBJECTIVE

The Problem Statement defined by SJM Industries:

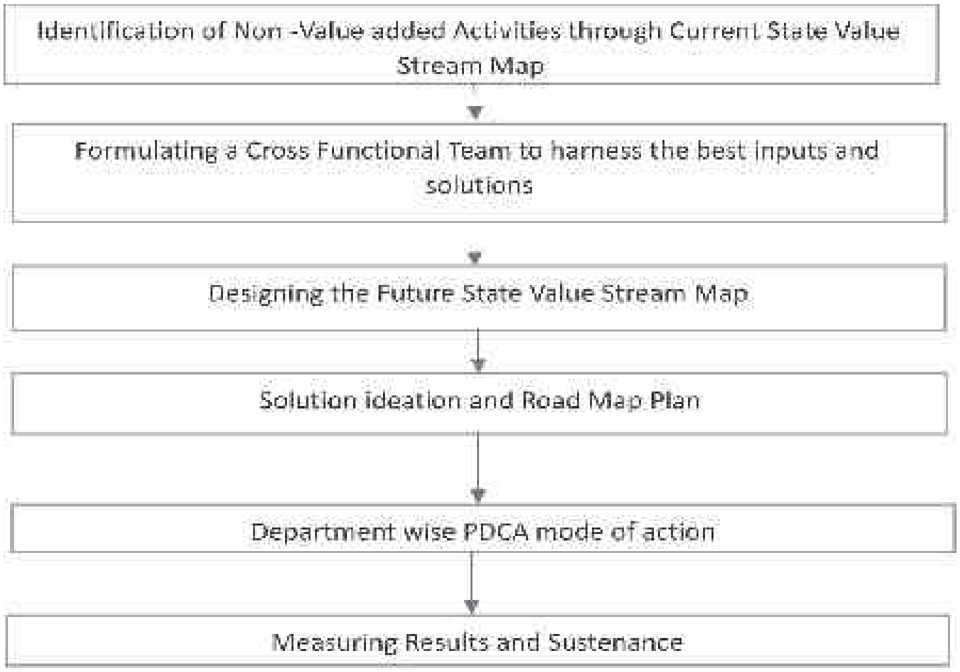
1. Elimination of multiple data entry sources - manual ledgers, excel sheets, Software
2. Creating a 100% robust system that can be utilized for audit purposes of the assortment unit
3. Delivering System generated reports and notification systems that inform the management about any mishap in the assortment unit

The objective of the research paper is to demonstrate the following:

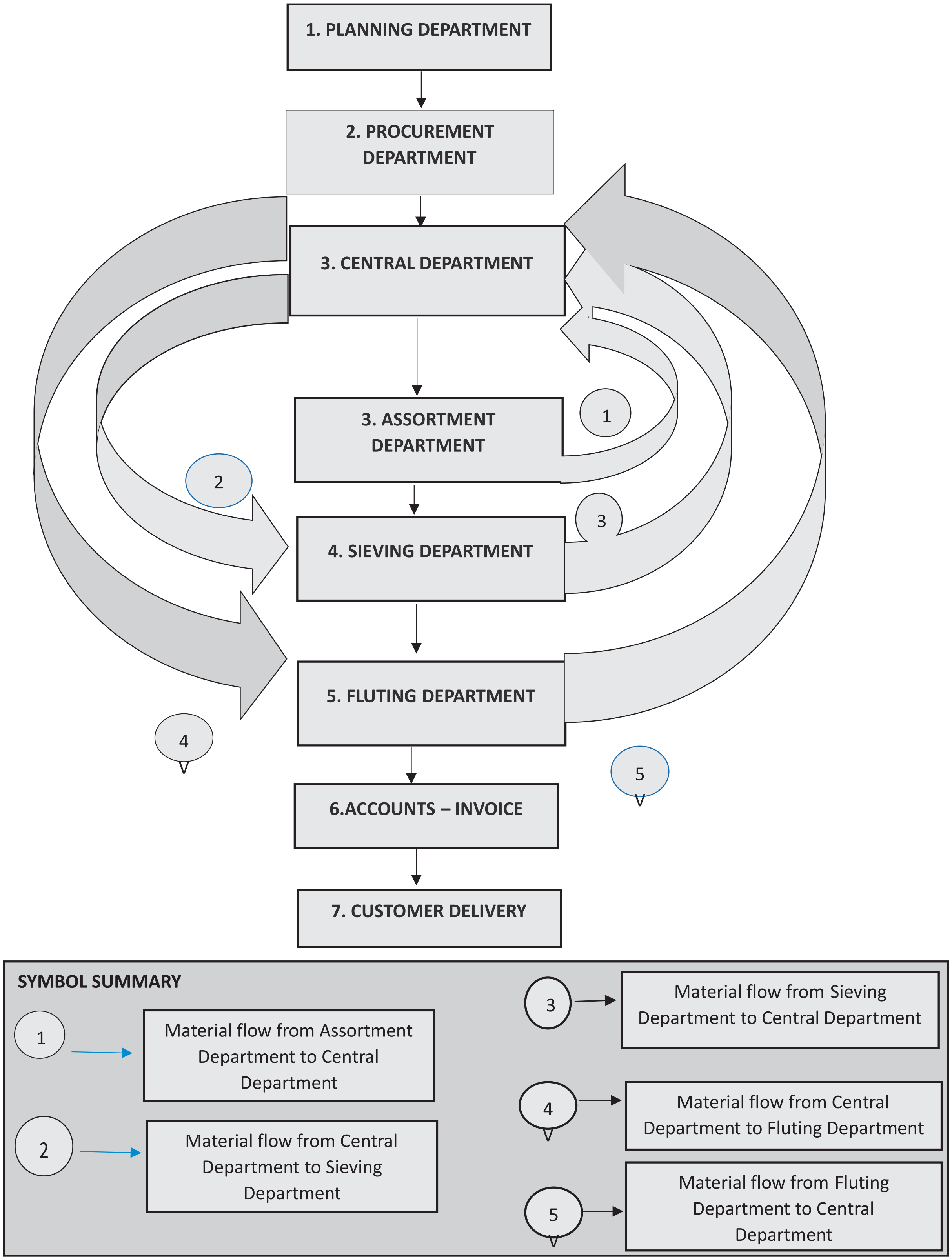
1. How Lean has improved the productivity of the diamond assortment unit
2. How to map principals of Lean to redesign a technology
3. Significance of a Cross functional team in Implementing Lean

Methodology

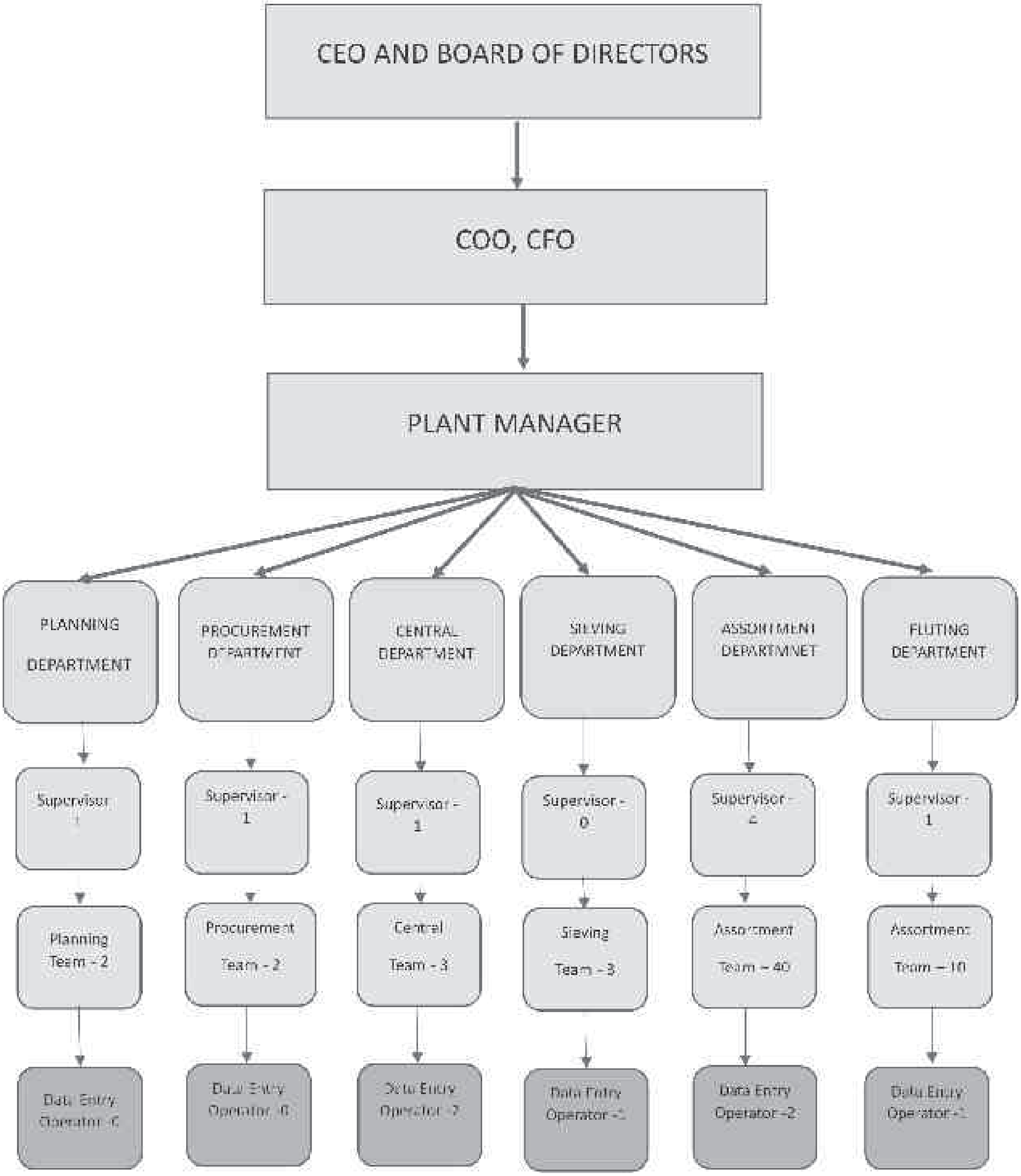
The Project at SJM Industries involved the following methodology:


Identification of Non -Value added Activities through Current State Value Stream Map
Formulating a Cross Functional Team to harness the best inputs and solutions
Designing the Future State Value Stream Map
Solution ideation and Road Map Plan
Department wise PDCA mode of action
Measuring Results and Sustenance

4.Process Flow Chart:


1. PLANNING DEPARTMENT
2. PROCUREMENT DEPARTMENT
3. CENTRAL DEPARTMENT
3. ASSORTMENT DEPARTMENT
4. SIEVING DEPARTMENT
5. FLUTING DEPARTMENT
6.ACCOUNTS – INVOICE
7. CUSTOMER DELIVERY
1
2
3
4
5
SYMBOL SUMMARY
1 Material flow from Assortment Department to Central Department
2 Material flow from Central Department to Sieving Department
3 Material flow from Sieving Department to Central Department
4 Material flow from Central Department to Fluting Department
5 Material flow from Fluting Department to Central Department

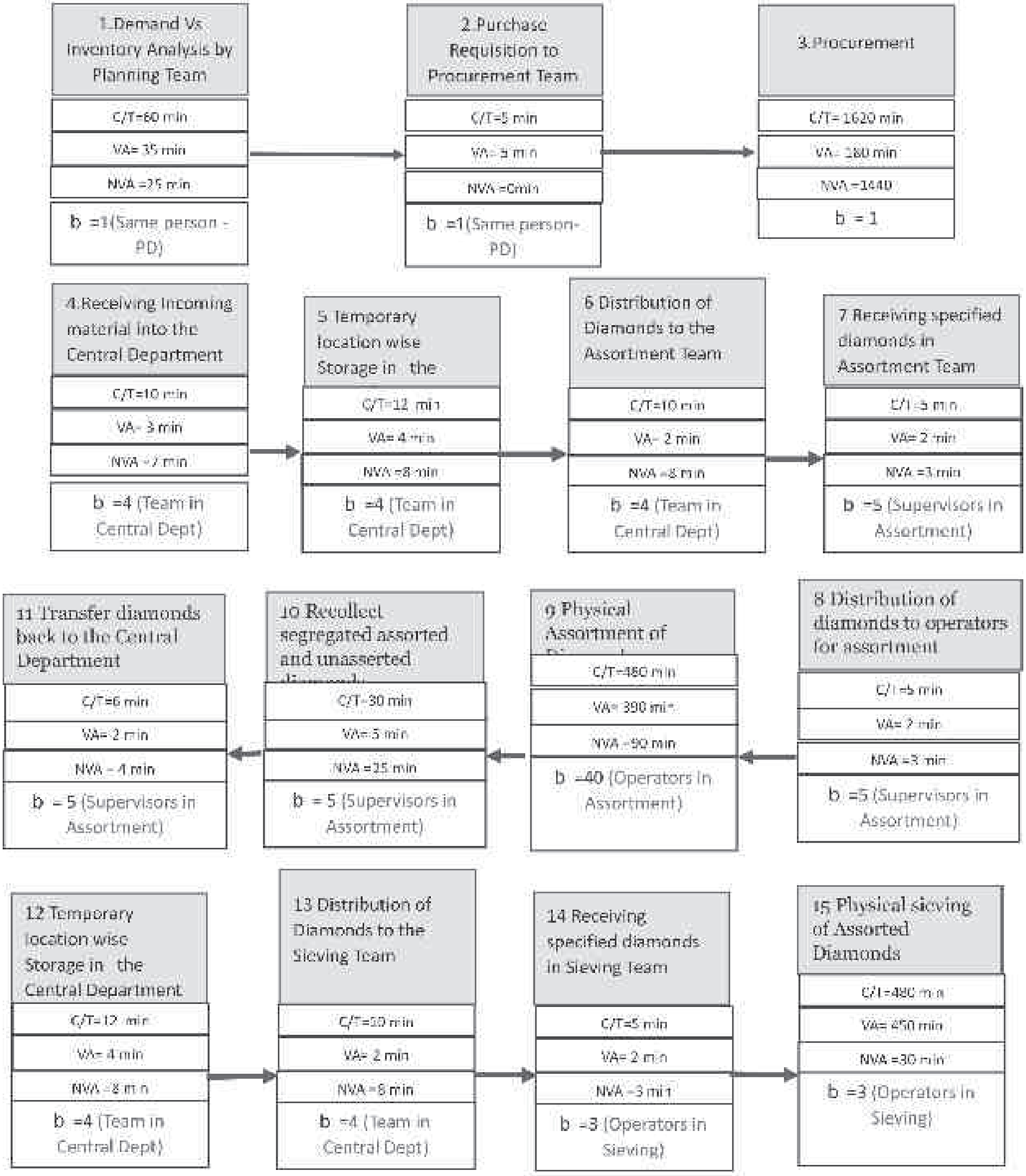
5.Organization Structure:

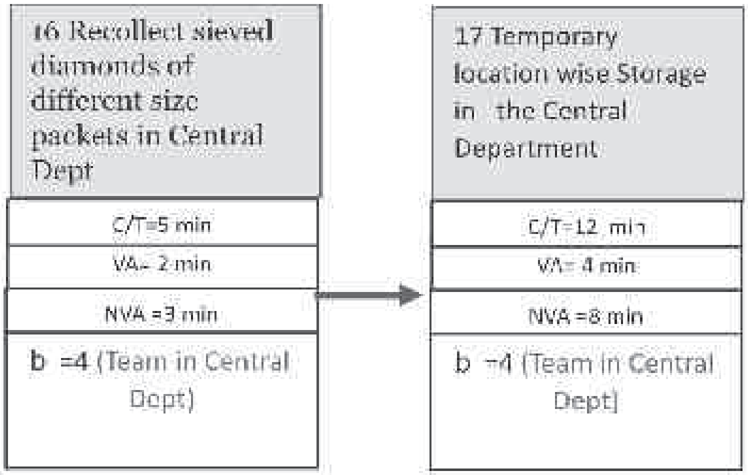

CEO AND BOARD OF DIRECTORS
COO, CFO
PLANT MANAGER
PLANNING DEPARTMENT
PROCUREMENT DEPARTMENT
CENTRAL DEPARTMENT
SIEVING DEPARTMENT
ASSORTMENT DEPARTMNET
FLUTING DEPARTMENT
Supervisor 1
Supervisor - 1
Supervisor - 1
Supervisor - 0
Supervisor - 4
Supervisor - 1
Planning Team - 2
Procurement Team - 2
Central Team - 3
Sieving Team - 3
Assortment Team – 40
Assortment Team – 10
Data Entry Operator -0
Data Entry Operator -0
Data Entry Operator -2
Data Entry Operator -1
Data Entry Operator -2
Data Entry Operator -1

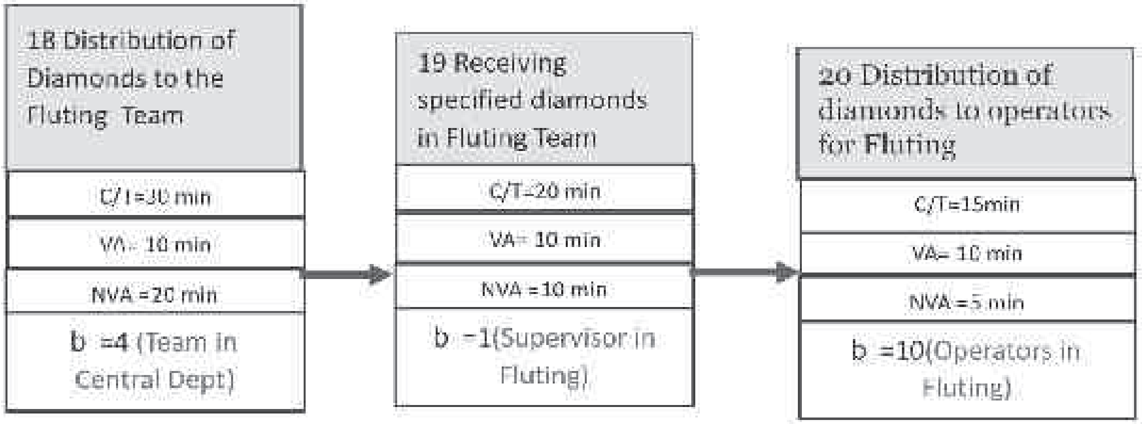
6.Department wise – Process Flow Chart

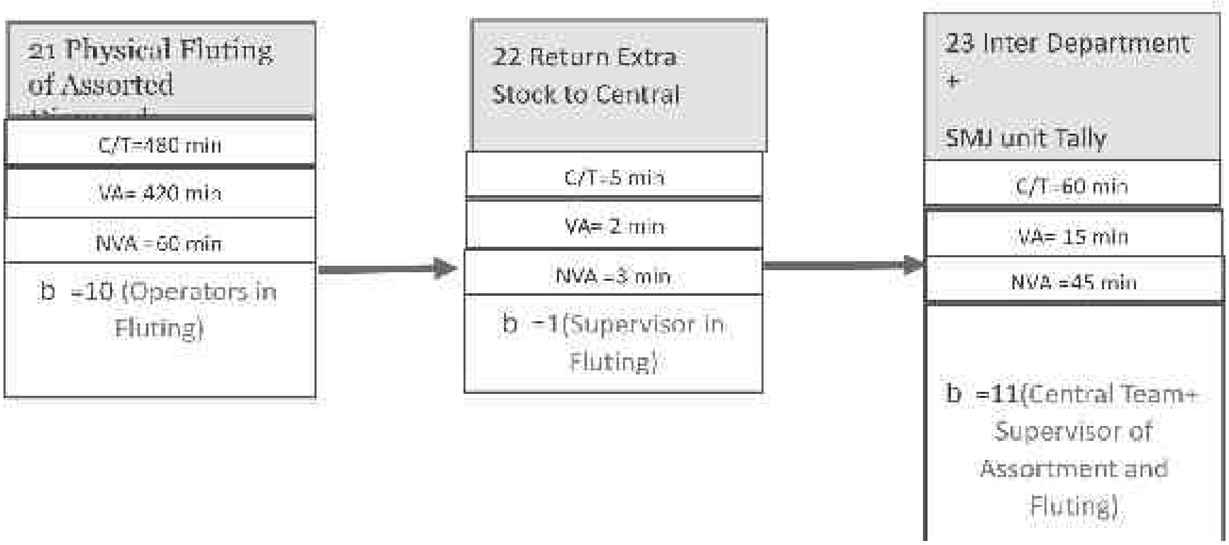
PLANNING DEPARTMENT	1. Receive Customer Orders 2. Scheduling for every department 3. Demand Study and Inventory Management 4. Creates Purchase Orders
PROCUREMENT DEPARTMENT	1. Demand Study and Inventory Management 2. Vendor Analysis 3. Receives Purchase Order 4. Physical Stock transfer from Vendor to SJM Industries
CENTRAL DEPARTMENT	1. Receiving stock from Procurement Team 2. Storing Stock at specific Locations 3. Transferring Stock to Assortment Department 4. Transferring Stock to Fluting Department 5. Transferring Stock to Sieving Department 6. Receiving Assorted Stock from Assortment Department 7. Receiving Extra Stock from Fluting Department 8. Receiving Stock from Sieving Department 9. Return Non -Specified Stock to vendor and generate Bills 10. Maintaining the Stock report and Tally report of the Central Department 11.
ASSORTMENT DEPARTMENT	1. Receiving Stock from Central Department 2. Distribution of Stock to operators on a daily basis 3. Process of Assortment 4. Receiving back every operator's stock that was assigned 5. Maintaining every operator tally record 6. Maintaining daily stock report and tally report of the Assortment Department
SIEVING DEPARTMENT	1. Receiving Stock from Central Department 2. Distribution of Stock to individual operators 3. Process of Sieving based on the requirements of specific sizes 4. Packet creation of every sieved size 5. Collecting and returning extra left-over stock to Central Department 6. Maintaining daily stock report and tally report of the Fluting Department
FLUTING DEPARTMENT	1. Receiving Stock from Central Department 2. Receiving the Customer orders (Challans) from Planning team 3. Distribution of Stock to individual operators 4. Process of Fluting 5. Receiving Left over stock from every operator 6. Returning extra left - over stock to Central Department 7. Maintaining daily stock report and tally report of the Fluting Department 8.

7.a. Current State Value Stream Mapping


1.Demand Vs Inventory Analysis by Planning Team
C/T=60 min
VA= 35 min
NVA =25 min
b =1(Same person - PD)
2 Purchase Requisition to Procurement Team
C/T=5 min
VA= 5 min
NVA =0min
b =1(Same person-PD)
3.Procurement
C/T= 1620 min
VA= 180 min
NVA =1440
b = 1
4.Receiving Incoming material into the Central Department
C/T=10 min
VA- 3 min
NVA =7 min
b =4 (Team in Central Dept)
5 Temporary location wise Storage in the
C/T=12 min
VA= 4 min
NVA =8 min
b =4 (Team in Central Dept)
6 Distribution of Diamonds to the Assortment Team
C/T=10 min
VA- 2 min
NVA =8 min
b =4 (Team in Central Dept)
7 Receiving specified diamonds in Assortment Team
C/T=5 min
VA= 2 min
NVA =3 min
b =5 (Supervisors in Assortment)
8 Distribution of diamonds to operators for assortment
C/T=5 min
VA= 2 min
NVA =3 min
b =5 (Supervisors in Assortment)
9 Physical Assortment of
C/T=480 min
VA= 390 min
NVA =90 min
b =40 (Operators in Assortment)
10 Recollect segregated assorted and unasserted
C/T=30 min
VA= 5 min
NVA =25 min
b = 5 (Supervisors in Assortment)
11 Transfer diamonds back to the Central Department
C/T=6 min
VA= 2 min
NVA = 4 min
b = 5 (Supervisors in Assortment)
12 Temporary location wise Storage in the Central Department
C/T=12 min
VA= 4 min
NVA =8 min
b =4 (Team in Central Dept)
13 Distribution of Diamonds to the Sieving Team
C/T=10 min
VA= 2 min
NVA =8 min
b =4 (Team in Central Dept)
14 Receiving specified diamonds in Sieving Team
C/T=5 min
VA= 2 min
NVA =3 min
b =3 (Operators in Sieving)
15 Physical sieving of Assorted Diamonds
C/T=480 min
VA= 450 min
NVA =30 min
b =3 (Operators in Sieving)


16 Recollect sieved diamonds of different size packets in Central Dept
C/T=5 min
VA= 2 min
NVA =3 min
b =4 (Team in Central Dept)
17 Temporary location wise Storage in the Central Department
C/T=12 min
VA= 4 min
NVA =8 min
b =4 (Team in Central Dept)


18 Distribution of Diamonds to the Fluting Team
C/T=30 min
VA= 10 min
NVA =20 min
b =4 (Team in Central Dept)
19 Receiving specified diamonds in Fluting Team
C/T=20 min
VA= 10 min
NVA =10 min
b =1(Supervisor in Fluting)
20 Distribution of diamonds to operators for Fluting
C/T=15min
VA= 10 min
NVA =5 min
b =10(Operators in Fluting)


21 Physical Fluting of Assorted
C/T=480 min
VA= 420 min
NVA =60 min
b =10 (Operators in Fluting)
22 Return Extra Stock to Central
C/T=5 min
VA= 2 min
NVA =3 min
b =1(Supervisor in Fluting)
23 Inter Department +
SMJ unit Tally
C/T=60 min
VA= 15 min
NVA =45 min
b =11(Central Team+ Supervisor of Assortment and Fluting)

7.b Calculation of Process Cycle Efficiency and Waveform:

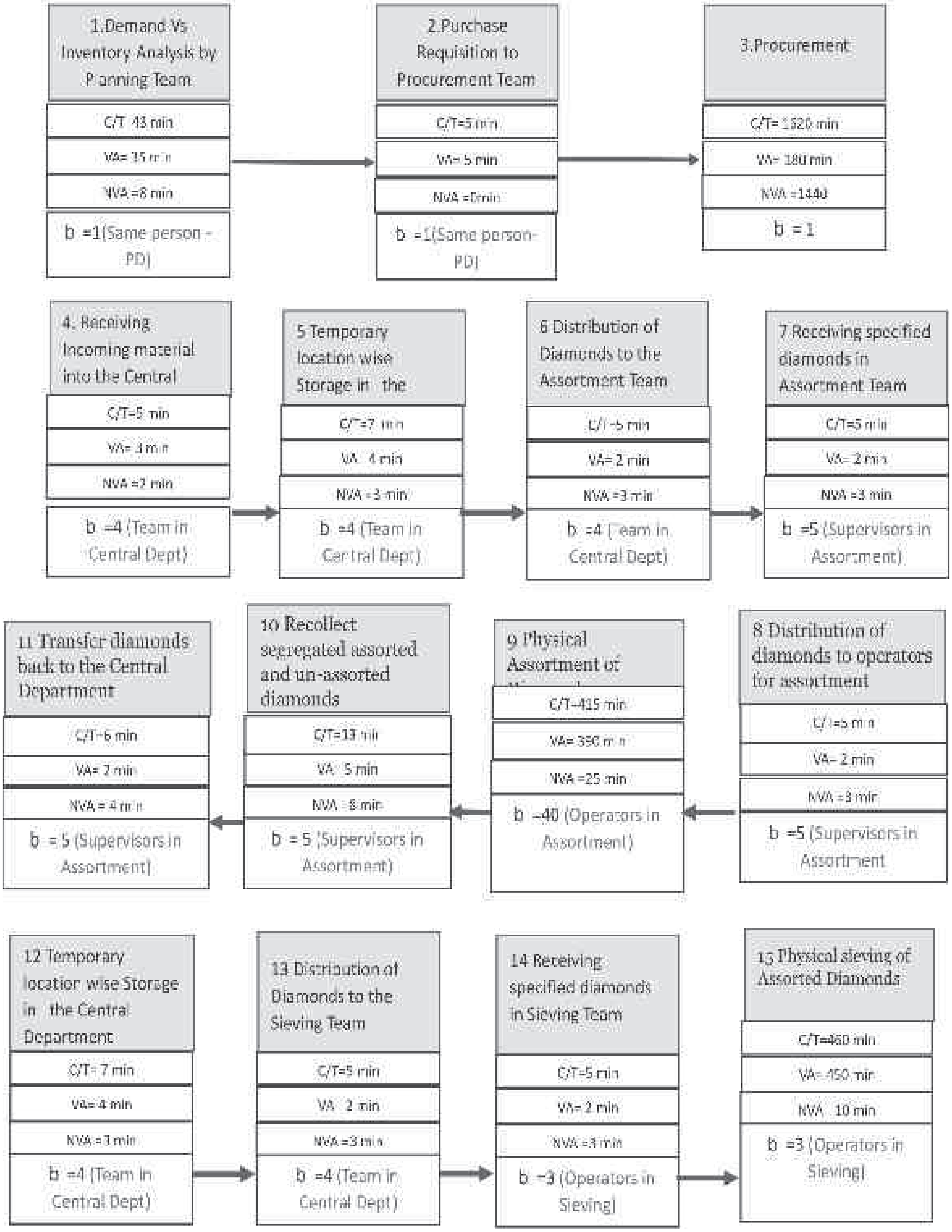
Parameter	Value
Total Value -Added Time	1561
Total Non-Value-Added Time	1816
Process Cycle Efficiency = (Sum of Value-Added Time /Total Lead Time)	0.4622

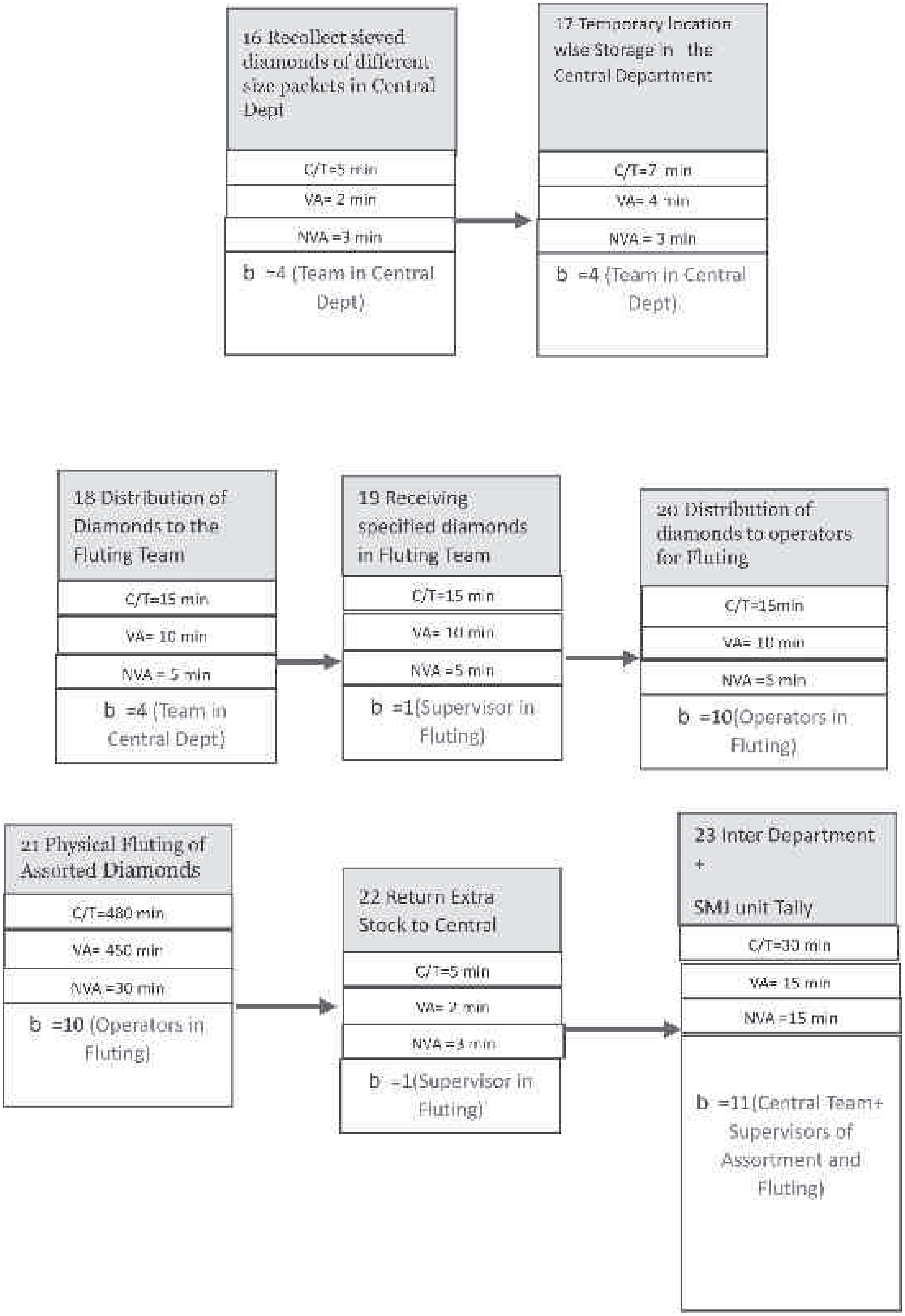
Sr. No	Process	Non-Value-Added activities
1	Demand Vs Inventory Analysis by Planning Team	• As data entry in the existing software was not done on a real time basis the planning team member would have to go to the 3 departments that handle the diamonds (Assortment, Fluting, and Sieving) and check their stocks written in manual ledgers to understand the actual physical inventory
2	Procurement	• Legal and documentation formalities • As Procurement takes place in a different facility the commute time is also a non-value adding activity
3	Receiving Incoming material into the Central Department	• The stock that is received is entered manually into ledgers • Sign offs are taken in the manual ledgers between the sender and the receiver • Waste of waiting as the ledgers is lying in some other departments for sign offs
4	Temporary location wise Storage in the Central Department	• The Opening of Vault • The Vault has different physical compartments and lots of packets which are not sorted and paced randomly in the vault. Searching of the right packet consumes a lot of time
5	Distribution of Diamonds to the Assortment Team	• Searching for the required specification packet in the vault. • Multiple data entries in Manual Ledgers, Excel and existing software (not real time) • Interdepartmental Sign offs in manual ledgers

6	Receiving specified diamonds in Assortment Team	• Multiple Data entry sources like – Manual ledgers, excel sheets and existing software (no real time data entry) • Manual sign off in ledgers
7	Distribution of diamonds to operators for assortment	• The operators waited for around 20 minutes at the opening of every shift, till the supervisor split one big packet into small individual packets of specified weight to every operator • Maintaining the transaction record for every operator manually and not on a real time basis • Daily manual calculation of individual productivity of individual operators • Wait for the recollection process
8	Recollect segregated assorted and unasserted diamonds	• Operators wait till their individual packets have been collected • Operators wait till the supervisor completes their individual tally • Operators wait till supervisors check the individual productivity and see whether it falls within the prescribed limits
9	Transfer diamonds back to the Central Department	• Multiple data entries in Manual Ledgers, Excel and existing software (not real time) • Interdepartmental Sign offs in manual ledgers
10	Temporary location wise Storage in the Central Department	• The Opening of Vault • The Vault has different physical compartments and lots of packets which are not sorted and paced randomly in the vault. Searching of the right packet consumes a lot of time
11	Distribution of Diamonds to the Sieving Team	• Searching for the required specification packet in the vault. • Multiple data entries in Manual Ledgers, Excel and existing software (not real time) • Interdepartmental Sign offs in manual ledgers
12	Receiving specified diamonds in Sieving Team	• Multiple Data entry sources like – Manual ledgers, excel sheets and existing software (no real time data entry) • Manual sign off in ledgers
13	Physical sieving of Assorted Diamonds	• Maintaining the transaction record for every operator manually and not on a real time basis • Daily manual calculation of individual productivity of individual operators • Wait for tallying received and forwarded record for every operator on a daily basis • Wait for the recollection process by the Central Department

14	Recollect sieved diamonds of different size packets in Central Dept	• Operators wait till their individual packets have been collected • Operators wait till the supervisor completes their individual tally • Operators check their individual productivity and see whether it falls within the prescribed limits
15	Temporary location wise Storage in the Central Department	• The Opening of Vault • The Vault has different physical compartments and lots of packets which are not sorted and paced randomly in the vault. Searching of the right packet consumes a lot of time
16	Distribution of Diamonds to the Fluting Team	The process of Fluting requires the Central Team to select a variety of diamonds from the vault and different Storage Locations • Searching for the required specification packet in the vault. • Multiple data entries in Manual Ledgers, Excel and existing software (not real time) • Interdepartmental Sign offs in manual ledgers
17	Receiving specified diamonds in Fluting Team	• Noting the incoming material from Central Department in the Manual Ledgers, Excel, Existing Software (not real time)
18	Physical Fluting of Assorted Diamonds	• Maintaining the transaction record for every operator manually and not on a real time basis • Daily manual calculation of individual productivity of individual operators • Wait for tallying received and forwarded record for every operator on a daily basis • Wait for the recollection process by the Supervisor of Fluting Department
19	Return Extra Stock to Central	• Multiple data entries in Manual Ledgers, Excel and existing software (not real time) • Interdepartmental Sign offs in manual ledgers
20	Inter Department + SMJ unit Tally	• All the departments verify the tally of individual operators • Go through multiple sources of data from Manual legers +Excel and sometimes the software to check the tally in the form of (Opening Stock + Incoming Stock -Transferred Stock = Closing Stock)

8.a. Future State Value Stream Mapping


1.Demand Vs Inventory Analysis by Planning Team
C/T 43 min
VA= 35 min
NVA =8 min
b =1(Same person - PD)
2.Purchase Requisition to Procurement Team
C/T=5 min
VA= 5 min
NVA =0min
b =1(Same person- PD)
3.Procurement
C/T= 1620 min
VA= 180 min
NVA =1440
b =1
4. Receiving Incoming material into the Central
C/T=5 min
VA= 3 min
NVA =2 min
b =4 (Team in Central Dept)
5 Temporary location wise Storage in the
C/T=7 min
VA 4 min
NVA =3 min
b =4 (Team in Central Dept)
6 Distribution of Diamonds to the Assortment Team
C/T=5 min
VA= 2 min
NVA =3 min
b =4 (Team in Central Dept)
7 Receiving specified diamonds in Assortment Team
C/T=5 min
VA= 2 min
NVA =3 min
b =5 (Supervisors in Assortment)
8 Distribution of diamonds to operators for assortment
C/T=5 min
VA= 2 min
NVA =3 min
b =5 (Supervisors in Assortment
9 Physical Assortment of
C/T=415 min
VA= 390 min
NVA =25 min
b =40 (Operators in Assortment)
10 Recollect segregated assorted and un-assorted diamonds
C/T=13 min
VA 5 min
NVA =8 min
b = 5 (Supervisors in Assortment)
11 Transfer diamonds back to the Central Department
C/T=6 min
VA= 2 min
NVA = 4 min
b = 5 (Supervisors in Assortment)
12 Temporary location wise Storage in the Central Department
C/T= 7 min
VA= 4 min
NVA =3 min
b =4 (Team in Central Dept)
13 Distribution of Diamonds to the Sieving Team
C/T=5 min
VA 2 min
NVA =3 min
b =4 (Team in Central Dept)
14 Receiving specified diamonds in Sieving Team
C/T=5 min
VA= 2 min
NVA =3 min
b =3 (Operators in Sieving)
15 Physical sieving of Assorted Diamonds
C/T=460 min
VA= 450 min
NVA 10 min
b =3 (Operators in Sieving)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NVA = 3 min
b =4 (Team in Central Dept)
18 Distribution of Diamonds to the Fluting Team
C/T=15 min
VA= 10 min
NVA = 5 min
b =4 (Team in Central Dept)
19 Receiving specified diamonds in Fluting Team
C/T=15 min
VA= 10 min
NVA =5 min
b =1(Supervisor in Fluting)
20 Distribution of diamonds to operators for Fluting
C/T=15min
VA= 10 min
NVA =5 min
b =10(Operators in Fluting)
21 Physical Fluting of Assorted Diamonds
C/T=480 min
VA= 450 min
NVA =30 min
b =10 (Operators in Fluting)
22 Return Extra Stock to Central
C/T=5 min
VA= 2 min
NVA =3 min
b =1(Supervisor in Fluting)
23 Inter Department
+
SMJ unit Tally
C/T=30 min
VA= 15 min
NVA =15 min
b =11(Central Team+ Supervisors of Assortment and Fluting)

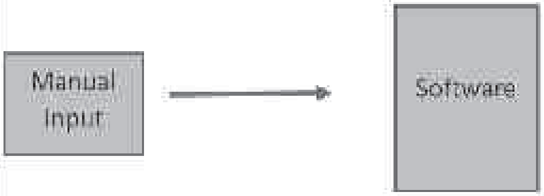
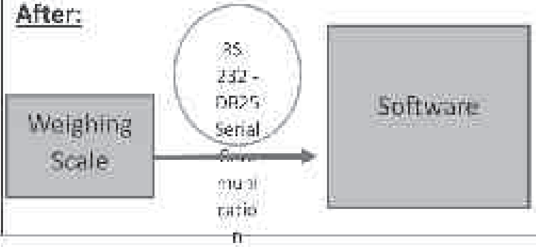
Parameter	Value
Total Value - Added Time	1591
Total Non-Value -Added Time	1587
Process Cycle Efficiency = (Sum of Value- Added Time /Total Lead Time)	0.5006

9.Problem Statement, Solutions and Actions, Results

ASSORTMENT DEPARTMENT:

	Problem Statement	
1	**30 percent of the Job Cards had tally issues with respect to the issued weight and received weight. Every day on an average 80 job cards is filled by the supervisor. This led to an average monthly 3 percent loss in the weight of the diamonds (Difference between the issued weight and the received weight)** **No system existed that would detect the error at the source when it came to the tally of issuing and receiving diamonds from operator. The Supervisors were many a times negligent to tally the accounts of an individual operator.**	
	Solutions and Actions	**Result**
	1. Early Detection + Immediate Correction leads to prevention **Pokayoke- Error proofing** **Before** The system would allow the job card to be saved even though the weight issued to the operator would not tally to the received weight. **After** A job Card was designed in the software that would not permit any job card to be saved that did not tally the issued weight and the received weight of the diamond for every individual operator **Action** The new designed job card gives alert notifications to the supervisor stating that	100 percent tallied job card. The Issued weight is now equal to the received weight which prevents any loss in the weight of diamonds due to human negligence. The control of the system is now through the software which was earlier vested in the supervisor. The supervisors are immediately notified about the loss in the diamond weight and ask operators to search for the lost weight. This has reduced diamond loss to 0.6 % and made the operators more alert and responsible.

	there has been a loss in the received weight from the operator. Unless the weight is recovered from the individual operator the job card will not be saved. It shows the supervisor the weight of diamond loss	

	Problem Statement	
2	**The software entries done for the weight of the diamonds often had a human error involved in it. Many a times the readings were wrong or the readings were not accurately written up to 3 decimal points. This created huge problems for tallying the stock. A lot of non- value -added activities were involved to trace the right reading**	
	Solutions and Actions	**Result**
	Quality Check at Source with Pokayoke: The operators would enter the stock weight manually and create mistakes. The software was designed in such a way that all the manual entries were prohibited in the software. The Weighing Scale was now directly connected to the software. The serial port communication facilitated between the two devices now took readings from the weighing scale only, rather than manual entries. **Before:**  **After:**  Weighing Scale RS 232 - DB25 Serial Communication Software	100 percent entries are now error free. Eliminates the non -value added time of rework done to tally the stock. Eliminates the non-value- added activities related to tracing the correct value of readings Around 120-150 minutes saved per week after elimination of the entry mistakes

	Problem Statement	
3	**24 percent erroring in the calculation of productivity measurement of individual operators.** **Manual Calculation of Productivity: The productivity of every operator was calculated manually. Operators would often complain that there was an error in the productivity measurement. Further this productivity calculation was subject to biases.**	
	Solutions and Actions	**Result**
	The Job Card now automatically calculates the In -Time when the diamonds are issued and also automatically calculates the Out – time when the job is completed	Eliminated the non- value-added activity of manual calculation of productivity.
		Personal biases are eliminated. 20 minutes of supervisor time is saved on a daily basis. The supervisor now utilizes this time to check in process QC. Eliminated data entry operators.

	Problem Statement	
4	**Information related to the total issue weight of diamonds to all the operators, total received weight of diamonds from the operators and their productivity were not available at a glance**	
	Solutions and Actions	**Result**
	One Glance Visual Management New report was designed on an individual screen in the software that allowed the management to have a one glance view of every day's weight records, and individual productivity of every operator	One Glance visibility about the individual operator's productivity and the diamond stock. Eliminated non value-added activity of searching and accumulating information from different sources of information. Saved 10 minutes of supervisor time daily. Helps in immediate decision making for the management. Incentives of individual operators are now decided through system and hence all personal biases have been eliminated.

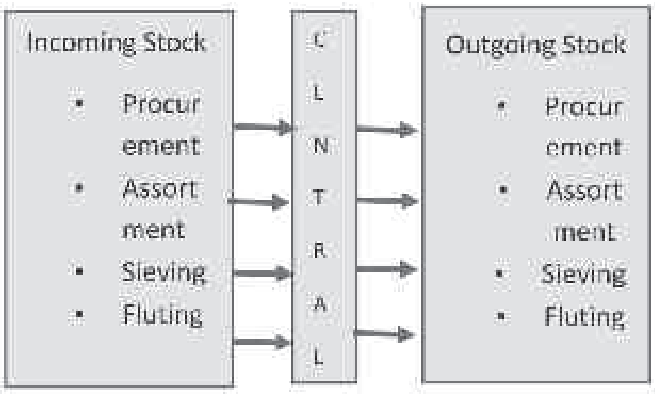
Problem Statement, Solutions and Actions, Results

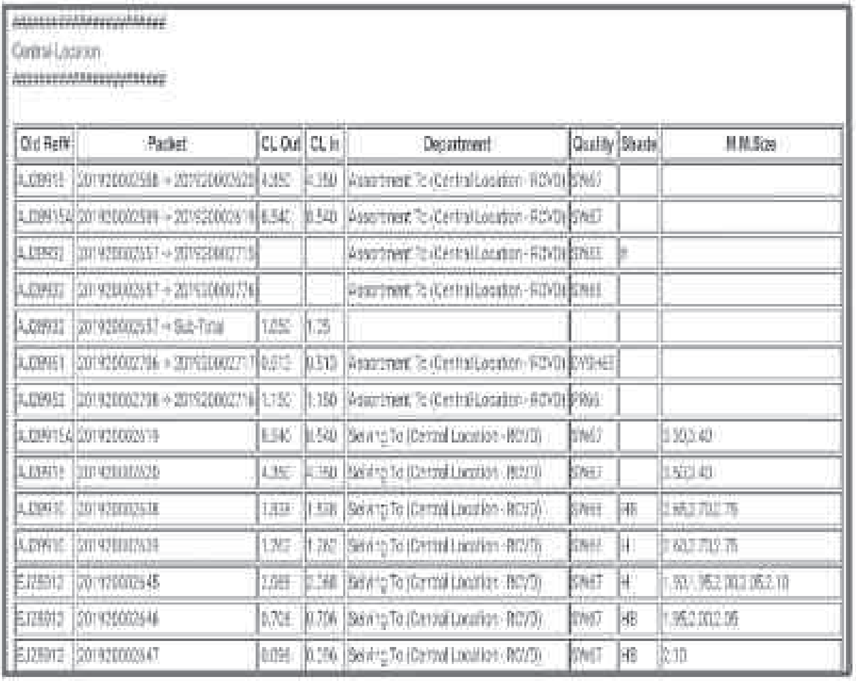
CENTRAL DEPARTMENT:

	Problem Statement	
1	**The inter department transfers that are done between the Central Department and the Fluting Department are very complex and consume a lot of time for both the departments**	
	Solutions and Actions	**Result**
	Elimination of Muda (Waste) The inter department transfers between Central and Fluting Department were carried out through an intermediate process, known as reservation. Stock required by the Fluting Department was first reserved by the Central department and then transferred to the Fluting department. This reservation process was complex and hence consumed time. The Process of reservation was identified as non- value added and hence it was eliminated. The inventory structure of the software was redesigned and a new inter department transfer screen was designed. The new screen totally eliminated all the hassles that were involved in reservations. Acknowledged transfers now take place in seconds for both the departments	1. Transfers that consumed around 3 -4 minutes per transaction now only consume around 10-15 seconds 2. Inter department transfers now take place real time Eliminated data entry operator from Central Department

	Problem Statement	
2	**Reliance on Manual Ledgers to tally the inter-department transactions. Every transaction acknowledgement required signoffs from both the departments. The manual ledgers did not maintain a standard format of record keeping. Maintaining the manual ledger consumed around a total of 30 minutes for all the transactions daily**	
	Solutions and Actions	**Result**

Redesigned the software to create daily inter department transaction report.
The following transactions from central department are encapsulated in the report





Central Location

Old Ref#	Packet	CL Out	CL In	Department	Quality	Shade	M.M.Size
AJ28915	201920002588 → 201920002620	4.350	4.350	Assortment To (Central Location - RCVD)	SW67		
AJ289154	201920002599 → 201920002619	6.540	6.540	Assortment To (Central Location - RCVD)	SW67		
AJ28932	201920002557 → 201920002715			Assortment To (Central Location - RCVD)	SW65	P	
AJ28932	201920002557 → 201920002716			Assortment To (Central Location - RCVD)	SW65		
AJ28932	201920002557 → Sub-Total	1.050	1.75				
AJ28951	201920002706 → 201920002717	0.510	0.510	Assortment To (Central Location - RCVD)	DYSH65		
AJ28952	201920002708 → 201920002716	1.150	1.150	Assortment To (Central Location - RCVD)	PR65		
AJ289154	201920002619	6.540	6.540	Sieving To (Central Location - RCVD)	SW67		3.303.40
AJ28915	201920002620	4.350	4.350	Sieving To (Central Location - RCVD)	SW67		3.503.40
AJ28910	201920002638	1.838	1.538	Sieving To (Central Location - RCVD)	SW65	HB	2.852.702.75
AJ28910	201920002639	1.262	1.262	Sieving To (Central Location - RCVD)	SW65	H	2.602.702.75
EJ28912	201920002645	2.068	2.368	Sieving To (Central Location - RCVD)	SW67	H	1.50/1.952.002.052.10
EJ28912	201920002646	0.706	0.706	Sieving To (Central Location - RCVD)	SW67	HB	1.952.002.05
EJ28912	201920002647	0.056	0.256	Sieving To (Central Location - RCVD)	SW67	HB	2.10

System oriented reports are generated.

No Manual Intervention possible to bias the reports.

Easy availability of transaction history to verify if final stock tallying is not correct.

Accuracy of the report depends on the real time data entry. Hence operators are compelled to do real time data entry.

Data entry lag in the system is averted.

Problem Statement, Solutions and Actions, Results

FLUTING DEPARTMENT:

<table>
<tr><td></td><td>Problem Statement</td><td></td></tr>
<tr><td>1</td><td colspan="2">Tolerance limits in issuing and receiving the Diamond stock was based on the individual supervisor. Often biases were created and controlled by the supervisor</td></tr>
<tr><td></td><td>Solutions and Actions</td><td>Result</td></tr>
<tr><td></td><td>Stratified weigh tolerance was programmed into the software as follows:
<table>
<tr><th>Packet Weight of Diamonds in Ct</th><th>Tolerance as a percentage of Packet Weight</th></tr>
<tr><td>Packet Weight of Diamonds in Ct <5</td><td>0.250%</td></tr>
<tr><td>5< Packet Weight of Diamonds in Ct<10</td><td>0.100%</td></tr>
<tr><td>10< Packet Weight of Diamonds in Ct<50</td><td>0.030%</td></tr>
<tr><td>Packet Weight of Diamonds in Ct>50</td><td>0.005%</td></tr>
</table>
</td><td>Diamond loss reduction by 6.12 percent.
No transaction can now proceed ahead without the received weight actually equal to the issued weight within the specified tolerance limits.</td></tr>
</table>

	Problem Statement	
2	**Challans were manually filled on paper and then a special data entry person would enter this data into the diamond software. This was a muda of over processing. Lots of errors were created by the data entry person due to the interpretation of manual handwritten challans**	
	Solutions and Actions	**Result**
	The Challan screen is now designed within the software itself. Every employee in the fluting department is now equipped with a tablet which permits them to enter the production order number which was used in challans. Once the Production Order number is typed on the new challan screen the challan opens up and employees can now fill in their own challan	1. Eliminated Muda of rework 2. Employees now feel empowered 3. Method of batching is now eliminated and is turned into a single piece flow 4. Daily 1.5 hours of non- value-added data entries has been eliminated to 0.5 hours daily. Operators can now utilize this time to prepare more flutes 5. Value added time has improved from 7.5 hours to 9 hours i.e. 13.33 %

		improvement in the value addition ratio 6. Number of flutes prepared per person improved from 60—70 flutes per day to 75-80 flutes per day. This led to approximately 14.28 percent improvement in the production

10.Measured Improvements (The improvements are based on monthly data collected after the technology implementation):

Sr. No	Department	Productivity Parameter	Previous state	Units in Current state	Percentage Improvement
1	**Assortment Department**	Defect Reduction in Job Card Entries. (Assumption – 80 job cards are filled on an average on a daily basis)	720 defects in 2400 job cards (30 percent Defects)	0 defects in 2400 job Cards	42.85 percent improvement in defect reduction
		Loss in Diamond Weight	3 percent loss in diamond weight (Difference between issued weight and received weight)	0.6 percent loss in diamond weight (Difference between issued weight and received weight)	3.03 percent improvement in recovery of lost diamond weight)
		Value added Time with respect to Job Card entries and the 30 percent error involved in it	Value Added minutes in Assortment department are 2200 minutes (Assumption – the plant works for 9 hours a day with 5 working days in a week). Non-Value-added activity in job card errors caused a loss of 120 minutes per week	Value Added minutes in Assortment department are 2680 minutes (Assumption – the plant works for 9 hours a day with 5 working days in a week). Non-Value-added activity in job card errors are eliminated saving 120 minutes per week	21.81 percent improvement in value added time
		Errors in productivity calculations	24 percent error in Productivity calculations of operators	O percent error in productivity calculation	31 percent improvement in the Productivity Calculations
		Absence of an individual operator's productivity report	No reports present	One Glance report on individual operators' productivity is now available	---
		Lack of Standardization	No Standard Operating Procedure	Simplified Standard operating procedure available	---

2	**Central Department**	Inter -Department Transaction Complexity	3-4 minutes were required to make one interdepartmental transaction	15 seconds are required to make one interdepartmental transaction	91.66 percent improvement per interdepartmental transaction
		Reliance on Manual Ledger	Out of the 540 minutes of available time 30 minutes are consumed in non-value-added activity of maintaining the manual ledger. VAR = 94.44%	Out of the 540 minutes of available time only 8 minutes are consumed in non-value-added activity of maintaining the manual ledger. VAR = 98.51%	4.317 percent of improvement in the daily value-added ratio
3	**Fluting Department**	Diamond Loss with respect to the parameter of diamond weight	No standards set with reference to the diamond weight loss between inter-department as well as intra – department transactions.	Standards are set as per the weight brackets. No transaction can now proceed if the tolerance standards are not met.	Diamond loss reduction by 6.12 percent
		Elimination of over processing	Challan entries are filled manually on paper by operators on a daily basis. This consumes around 1.5 hours per operator / day. These entries are further duplicated into the software by the data entry person	Operators now directly enter their readings in a user-oriented format such that now their system entry time has been reduced from 1.5 hours daily to just 0.5 hours daily	13.33% improvement in the daily value - added ratio of every operator. Number of flutes produced per day by every operator improved from approximately 70 flutes to 80 flutes. Thus the production improved by 14.28 percent approximately

11.Results and Conclusion:

1. ASSORTMENT DEPARTMENT

- 100% error free job cards are now tallied. The error rate has reduced by 42.8 %
- Diamond Loss reduced from 3% to 0.60. There has been an improvement of 2.4 % in the recovery of diamonds
- Value addition of 27% was done to the daily working hours of Supervisor primarily after errors in the Job Card entry were eliminated
- The Job Card errors would then snowball to create errors in the Productivity Calculation of individual operators. 31 % improvement was achieved in the productivity calculations of operators bringing the error rate to 0%

2. CENTRAL DEPARTMENT

- 91.66 % improvement in transaction rate. The Transactions that consumed 3-4 minutes prior redesigning technology now consumes only 15-20 seconds

- 4.317 % Improvement in the daily value -added ratio after eliminating reliance on manual ledgers

3. FLUTING DEPARTMENT

- Standardization in diamond loss as per the stratified weight bracket has reduced diamond loss by 6.2%
- 13.33% improvement in the daily value-added ratio after eliminating Muda of over processing the same challan entry two times
- 14.28 % improvement was achieved in the production of flutes. Prior to redesigning the technology based on Lean Inputs approximately 70 flutes ere prepared. Now the count has risen to 80 flutes

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