

# **INVENTORY OPTIMIZATION THROUGH RE-EXPORT PROCESS IMPROVEMENT**

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## Citation

This project for the “Inventory optimization through re-export process improvement “came in my mind since I personally have worked in Export oriented Units and the inventory for the imported items as well as the items which needs to be re-exported are become a bottleneck in general, So I have started to work on this project and gone through below literature

## Review

I have gone through the Central excise and custom site ( [www.cbec.gov.in](http://www.cbec.gov.in) and [www.custom.gov.in](http://www.custom.gov.in)) and gone through the complete procedure of export, import and re-export to proceed this project on micro level, this site has help me a lot.

There is summer-internship carried out by some of the student on export process and documentation and re-export process, this study was also useful in carrying of this project. but till now it was not focused on the impact of process improvement and proportionate reduction on inventory, I this project process optimization and their proportionate impact on inventory has been clearly defined.

Concept of Six Sigma I got during my working in manufacturing industries i.e. Tube Investment of India Ltd, Bry Air Asia Pvt Ltd, Moser Baer india Ltd , self as yellow belt certified and have gone through 3-days workshop on six sigma by Motorola. The site of Motorola University(<http://www.muelearn.com/>, [www.sixsigma.com](http://www.sixsigma.com))) proved as very valuable information and concept to carry out and complete this project effectively.

The concept of Inventory came in my mind during working in the supply chain deptt of the industries and gone through the conceptual study of Inventory on (<http://www.studymode.com/>, [www.ukessay.com](http://www.ukessay.com) ).

I have shared my thought with my guide **Prof R.S Ojha** and my friend **Prof Pankaj Singh**, I really thankful to my guide Prof R.S. Ojha for giving the valuable input and guidance on time to time as well as can't forget the input of Prof Pankaj Singh.

## General Introduction of Project

This Projects is based on the Approach of Six Sigma strategy by the application of industrial engineering technique i.e. CPM, process analysis, brain-storming session between cross functional depts.

**The Six Sigma roadmap- Breakthrough strategy is as below**

Stage	Phase	Objective
Identification	Define	Identify key business issues
Characterization	Measure Analyze	Understand current performance levels
Optimization	Improve Control	Achieve breakthrough improvement
Institutionalization	Standardize	Integrate Six Sigma in day to day functioning.

### Short Focus on the Projects

Group-A indicates to the set of 3nos of Export Oriented Companies i.e. EOU , EOUs are the export oriented units which are taking full advantage of foreign trade and benefits concerned to exports .since exports provide our country foreign exchange. These 3-nos of EOU are premier in their respective fields like I have collected the data from 3-nos of EOU companies from different field like medical devices & optical media .

Once we go through the inventory of imported items, it consumes lot of money and because of the delay in getting the warranty claim/job-work from abroad supplier these EOUs are bound to carry a lot of inventory of re-exported items.

In simple terms, let me describe about re exports. If you categories exports as foreign goods and domestic goods, the export of foreign goods is called re-exports. This is the simplest method of understanding about re-exports. If any goods imported from another country (it becomes foreign

goods) and thereafter exporting back, such goods are fallen under re exports. For example, a machinery has been imported in to a country for testing purpose and after necessary testing, the said machinery is sent back. Here, the process of sending back such machinery is called re-exports

### How the Idea of this project came in Mind

- **Reduction in safety stock, fix-up the minimum point of Re-order level:** Since the GROUP-A is a set of 3-nos of Export Oriented companies and one of the premier manufacturing company of their segment of India and so the costs associated even with smallest of the activities are massive. Considering this factor , we came to the result that even minor increase in the volume of material ordered leads to increase of inventory and badly affecting the cash flow of the organization. So this project is mainly focused on the reduction of the total cycle time of re-export process and proportionate reduction of inventory.
- **How to eliminate the Superfluous activities:** Re-Export is nothing but a kind of process and this projects is a kind of process optimization. This type of study never has been done since it could not be focused on the inventory increase just because of non-valu added activities as well as casual approach in this process since company is maintaining the sufficient stock to face and overcome any break-down .
- **Elimination in demurrage charges:-** Getting the custom clearance well in time from port is also an important part of this process and any more delay in clearance and keeping the material at port leads to the charges of demurrage which is a monetary loss of the company and again will impact on the inventory on hand, so the getting paper well in time from importer and going ahead for clearance process once the material is in-transit leads to reduction in the total process cycle time.
- **Innovative approach in process optimization:-** In this process study lot of innovative idea came in mind i.e. reduction in clearance time as mentioned above, reduction in inventory carrying cost, giving tentative projection to the importer makes this process easier and resulted in the reduction of cycle time.

## Objectives behind this project

Through this projects, below purpose has been achieved:-

- The process of re-export has been explained to all concerned and make them understood thoroughly..
- Measurement of each individual activities has been started to come in monitoring..
- Awareness regarding inventory reduction has been institutionalize in the company:
  - What is the importance of the stock level
  - Because of process in-efficiency how it is impacting the cost concerned to Inventory.
  - Defined level of safety stock.
- More time taking activities has been pointed out..
- Alternatives to optimized the process and cost concerned with process has been found out..

### M-Measure—Phase of Six Sigma

This phase involves selecting product characteristic, mapping respective process, making necessary measurements and **recording the results** of the process. This is essentially a data collection phase.

As for as measurement is concerned , there are mainly 10-nos of activities through which the whole process of re-export has to pass-on listed as below , we have the data of 3-companies which are taking the time as given below in days

SI	Activity in re-export process	Initial avg time taken	Logical Time	EOU-1	EOU-2	EOU-3
1	RMA received	17	6	20	16	16
2	Documents from stores to Commercial	10	5	10	10	10
3	Correct documents from stores to Commercial	8	4	8	8	8

4	Preparing the Application	3	1	3	3	3
5	Applying for Permission	1	1	1	1	1
6	Grant Permission	10	3	10	10	12
7	Preparing the Documents	3	3	3	3	3
8	Send the Docs to F/F	1	1	1	1	1
9	Receive the Shipping Bill from F/F	4	2	4	4	4
10	Dispatching the Material (after receiving SB)	3	2	3	3	3
		60	28	63	59	61

### Analysis-Phase of Six Sigma

In this phase an action plan is prepared to plug the “GAP” between the existing practice running in the organization, their pros & cons and how the organization is expecting them to work in alignment of meeting the desired goals for a product, process or service. Through the analysis phase organization concludes the short and long term plan of implementation.

#### ➤ Identification of the root cause of the process

In any of the process it is important to finding out the route case of the defined problem, making the complete road map of future course of action. The clear understanding of the root cause is as important as the complete project itself. After having several brainstorming session and cross-functional meeting below points were come out.

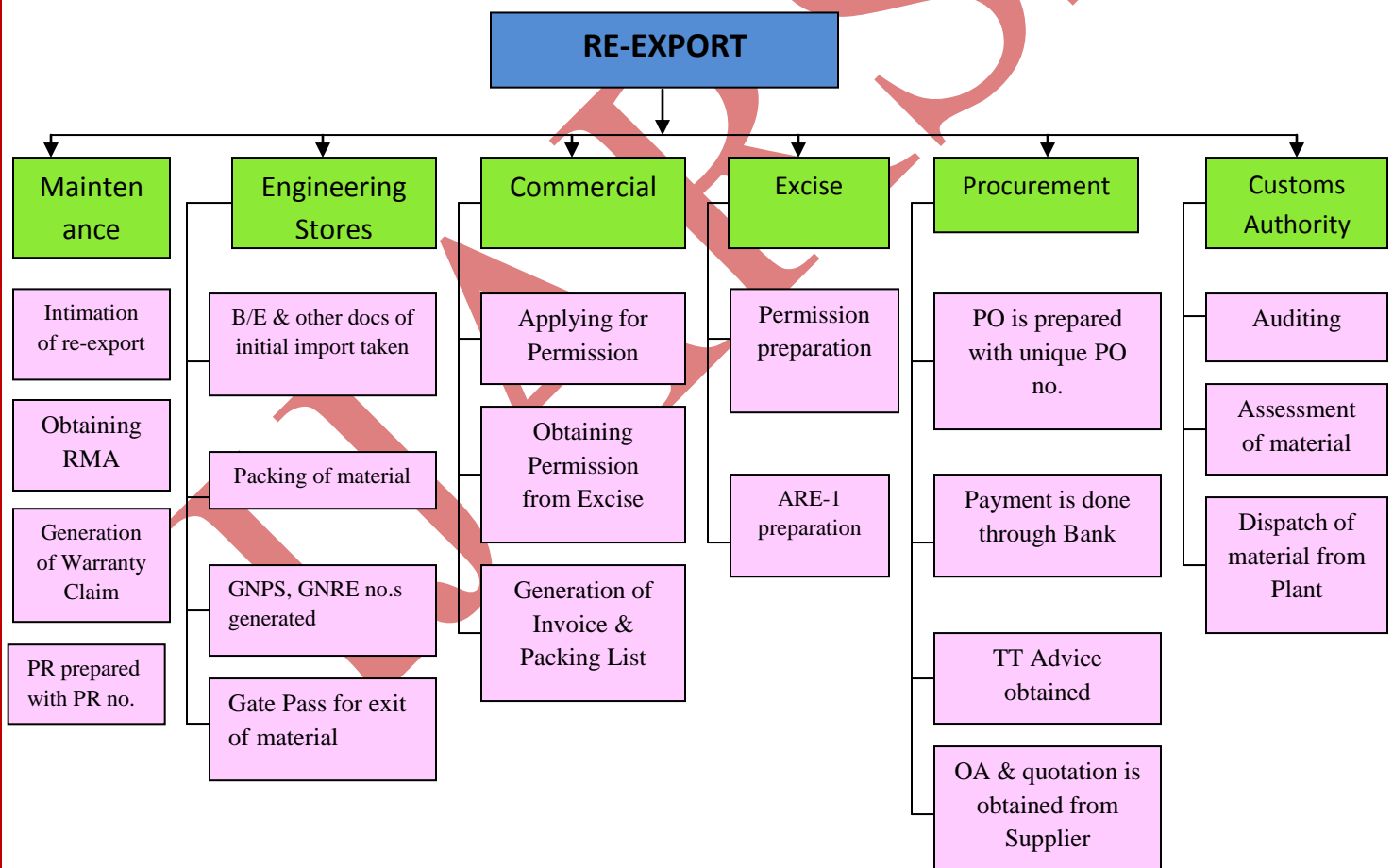
- a) How can we reduce the process -time and costs incurred in re-export process of organization?
- b) How can we came to lowest level of inventory for the items which has to be re-exported and deriving the lowest safety stock?
- c) How can we came to lowest level of inventory holding cost, inventory carrying costs, etc which are associated with the process of re-export?

- d) How can we eliminate the non value added activities by the different inter-connecting department.
- e) How can we reduce the total time taken in the completion of whole process through micro analysis of each individual process and their dependent process in detail.
- f) How can we maintain maximum process efficiency with the less and less expenses.

As a whole in this process of Analysis the root cause behind delays has been find out and remedial action has been taken by fixing up each individual/departmental key Result Areas. Complete road-map of the re-export process starting from maintenance deptt to commerce deptt has been listed ,their initial time taken and logical time is mentioned as below..

SI	Activity in re-export process	Initial avg time taken	Logical Time	Analysis
1	RMA received	17	6	This is the phase where the interaction of 4 Nos of party happens, since maintenance give the request to engg-store for warranty claim or job-work along with complete technical break-up and further the store forward this request to purchase depts. Along with necessary documentary proof to get the RMA(Return Material Authorization) from Supplier, It completes after multiple information exchange among these deptt and this is the phase where an optimized SOP is required for the substantial reduction of time taken in getting The RMA from abroad supplier
2	Documents from stores to Commercials	10	5	Based on the maintenance input and specs and part no provided , store has to find-out the documents concerned to importing of that parts i.e. BOE, Invoice, GSP etc and it has to be provided to commercial to apply to excise depts. to get the permission from central excise, * Once the documents provided to commercial, commercial go to apply to central excise for permission and their may be several commercial & technical query from excise deptt and the suitable reply has to be send to the government authorities with the help of store, maintenance and purchase depts. as well as finally correct document availability has to be ensured to excise depts. *Once the depts. get convinced they give the permission for re-export * All these liasoning need to be monitor and follow-up very precisely to get the permission with very short time . * In optimum cases it has been achieved $(5+4+1+1+3) = 14$ days
3	Correct documents from stores to Commercials	8	4	
4	Preparing the Application	3	1	
5	Applying for Permission	1	1	
6	Grant Permission	10	3	

7	Preparing the Documents	3	3	* After granting the permission or even simultaneously the concerned depts./commercial need to do all the preparation to prepare the documents and send the same to Freight Forwarders.
8	Send the Docs to F/F	1	1	
9	Receive the Shipping Bill from F/F	4	2	* In optimum it is observed as (3+1+2) = 6 days including getting the shipping bills from FF.
10	Dispatching the Material (after receiving SB)	3	2	It is ideal time to do the packing and getting the sealing from excise . So 2-days is optimized time
	<b>Total working days</b>	<b>60</b>	<b>28</b>	





## FINDING OUT THE CRITICAL PATH

As we know that Critical path Method (CPM) technique is most effective technique of industrial engineering through which we can come o know that which activities can be eliminated or merged with if any of the activities in view of the reduction of the whole process cycle time.

The critical path method (CPM) is a step-by-step technique for process planning that defines critical and non-critical tasks with the goal of preventing time-frame problems and process bottlenecks. The CPM is ideally suited to projects consisting of numerous activities that interact in a complex manner.

In applying the CPM, there are several steps that can be summarized as follows:

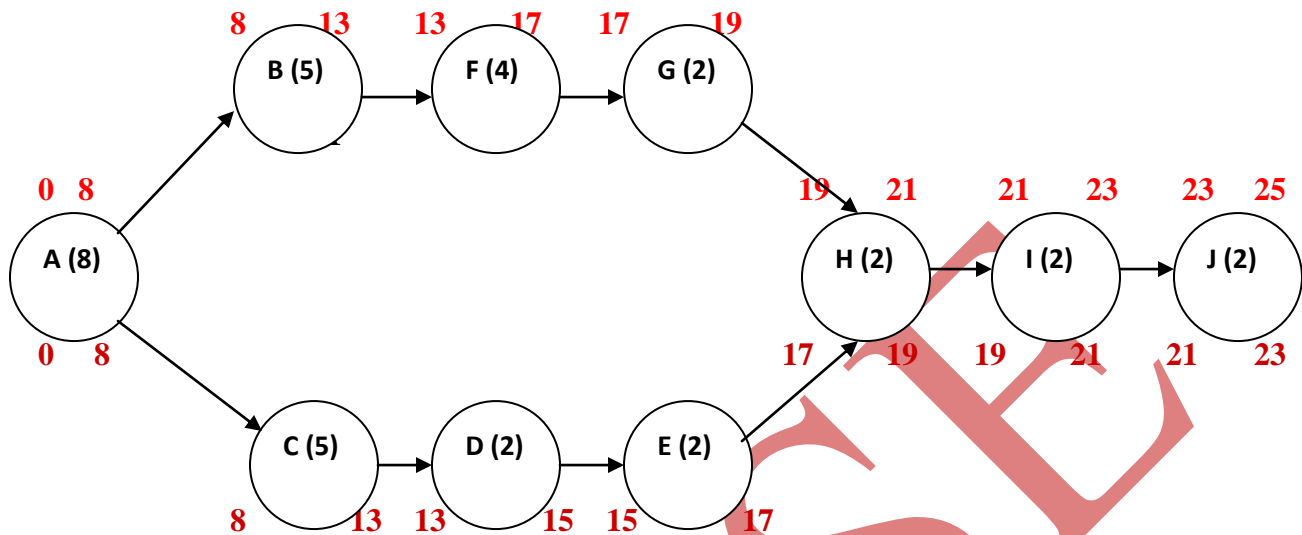
- Define the required tasks and put them down in an ordered (sequenced) list.
- Create a flowchart or other diagram showing each task in relation to the others.
- Identify the critical and non-critical relationships (paths) among tasks.
- Determine the expected completion or execution time for each task.
- Locate or devise alternatives (backups) for the most critical paths.

SI NO	Activity in re- port process	Name of Activity	Predecessor	Initial days taken	EOU- 1	EOU- 2	EOU- 3	Logical Time	Least time (a)	Most probable time(m)	Greatest Time (b)	Expected Time (t)
1	RMA received	A	START	17	20	16	16	6	6	8	10	8
2	Documents from stores to Commercials	B	A	10	8	12	8	5	5	5	6	5
3	Correct documents from stores to Commercials	C	A	8	10	12	10	4	4	5	6	5
4	Preparing the Application	D	C	3	3	3	3	1	1	2	2	2
5	Applying for Permission	E	D	1	1	1	1	1	1	2	2	2

6	Grant Permission	F	B	10	10	10	12	3	3	4	7	4
7	Preparing the Documents	G	F	3	3	3	3	3	1	2	3	2
8	Send the Docs to F/F	H	G	1	1	1	1	1	1	2	3	2
9	Receive the Shipping Bill from F/F	I	H	4	4	4	4	2	2	2	3	2
10	Dispatching the Material (after receiving SB)	J	I	3	3	3	3	2	1	2	3	2
				60	63	65	61	28	25	34	45	34

- RMA received
- Docs received from stores to commercial
- Correct docs received
- Preparation of Application
- Applying for Permission
- Permission grant from Excise
- Preparation of documents
- Documents forwarded to F/F
- SB received from F/F
- Dispatch of material

Activities	Preceding Activities	Normal time (Days)
A	-	8
B	A	5
C	A	5
D	C	2
E	D	2
F	B	4
G	F	2
H	G,E	2
I	H	2
J	I	2



As We have gone through the CPM study of and its net-work model and found the below path –

Path-1

A----→B----→F----→G----→H-----→I-----→J = 25-Days

Path-II

A----→C----→D---→E----→H-----→I-----→J = 23-Days

So we found our critical path is 1<sup>st</sup> Path which is taking 25-days time, we found another path which is taking 23-days so it is clear that in any of the circumstances the whole process of re-export will not take more than 25-days.

Now it is concluded that the existing study of 3-different export oriented companies reveals that they are taking on an average time of 60-days which is much beyond what we have derived logically and with engineering approach, further inventory will come down in the same ratio as well as positive impact on cash flow of the company will be there.

### Improvement Phase of Six-Sigma approach

This is one of the very important and final phase of six sigma which mainly focus on the improvement i.e. recommendation/induction of derived and proved method in the system to achieve the desired level of target for a particular product or process.

## Major Findings and recommendations

### 1<sup>st</sup> Finding

Return Material Authorization (RMA) receiving from supplier get delayed or receiving the incorrect does not meet the purpose and in existing practice it was taking around 14-day to get the correct RMA.

**Impact of Finding-1st:** Delay in receiving the RMA from supplier leads to the delay in preparation of documents by the interconnecting depts. i.e. maintenance, Store and Commercial .

### Recommendation

It was decided to inform the supplier regarding problem at the moment when problem occurred and send the RMA format and will send the technical analysis/write-up immediate within a day or two after sending the RMA format, So supplier will prepare himself for the compliance of RMA and will send immediately and in this way it will take hardly 6-days to get the RMA from the date of reporting of problem to supplier.

New sequence of RMA receiving from Supplier will be as below.

1<sup>st</sup> Day: Immediate intimation to supplier regarding problem on email by maintenance deptt.

2<sup>nd</sup> Day: Receipt of filled RMA format from supplier along with signature & consent.

Day 3: Filling the necessary details and providing it to store/commercial.

This process may complete within 3-days , but there is possibility of the unavailability of the concerned technical person on that day as well as weekend/ holidays so lining up all these activities easily can be completed within 6-working days.

### 2nd Finding

In general maintenance is taking 3-days time to hand over the document to store , even though it can be given within one working day which is the target for maintenance depts.

**Impact of Finding-II:** Once the store will receive the documents delay, it will make delay the further processing of documents resulting in delay in export of goods. This delay will impact on inventory as well as expiry of shipping bill for which validity is 7-days from the date of its generation and again it needs to be filed in custom.

### 3rd Finding

Store is taking on an average (10+8) i.e. 18-days time to handover the correct documents to commercial depts. from the date of receipt of the details/documents from maintenance depts. Logical/target time to prepare and hand-over the correct document to commercial is divided in two segment i.e. 5 & 4 days ,total 9-days.

**Impact:** delay receiving of the documents from store to commercial depts. Leads to the late processing of documents for pre-export statutory / excise compliance and finally it will get delayed the re-export of materials.

### Recommendation for Finding 2<sup>nd</sup> & 3<sup>rd</sup>

3-core interacting depts. i.e. maintenance, store and commercial become mutually agreed to exchange of information and documents through emails, so that the concerned depts. can start their home-work well in time as well as in alignment of target date, if any of the depts. Is stucking to achieve the completion of their activities, they start sending reminders to the concerned depts. And all interacting depts. Achieve their set target level within defined time.

Further to achieve the activities most of the documents are induced in ERP system and linked with server and arrive at result that this can be completed maximum within 9-days of time frame.

### Finding-4

In general getting the permission from excise was taking the 10-days time because of below reasons.

- Query came from concerned authority of excise i.e. superintendent.
- Non availability of issuing authority (Superintendent of Excise) at office.
- Not Technologically trained of excise staff
- No clear description, No transparent valuation etc with respect to the invoice and other

**Impact:** Delay in getting the permission from Excise will further make the delay in the filing of shipping bills and finally the re-export of the materials will get delayed.

#### **Recommendation for Finding-4**

- Once the proper scanning and accuracy of documents will be maintained before submitting to excise depts. Then it is rare chances to get the repeated query from excise depts. And it will be easy to convince excise authority and probability to get the permission well within target time of 3-days rather than taking 10-days time.

Pre-information to excise depts. by the concerned commercial in-charge

#### **Finding-5**

Difference in technical description on different documents leads to the cause of delay at port at the time of shipping/custom clearance resulting in payment of moneys for demurrage and getting delay to get the material in time, So accuracy and synchronization in complete transaction among different depts. And abroad supplier is very important to avoid any delay in the whole process.

**Impact:** Delay in movements of goods at port at the time of re-export and import, so synchronization of the description is very important.

#### **Recommendation for Finding-5:--**

A central team of techno-commercial people (maintenance, excise & commercial) has been formed to scan all the document of the re-export process.

#### **Finding-6**

These companies are more dependent on freight forwarders ,who are not so sensitive of the delays in getting the materials.

**Impact:** The casual approach of Freight forwarders leads to the delay in pick and delivery of materials.

#### **Recommendation of Finding-6**

A rate contract has been induced with freight forwarders having the time-bound and penalty clause, which sensitize the freight forwarders to provide the service with accuracy.

### Control phase of Six Sigma DMAIC approach

Having achieved the improvement, it needs to be sustained. There is a general tendency for all processes to degrade unless there is an effective control mechanism which is able to detect incipient deviation in the process, which are then analyzed and necessary corrective action is taken to bring the process back to the state which was attained after planned improvement was effected. These control mechanisms must be integrated in the form of a quality management system document which should be made mandatory Unless we control the business processes in the form of documentation and ongoing process controls, processes will tend to degrade overtime and shall loose the gains achieved in the improvement activities To control and monitor the whole process within the described time SOP is raised on each individual levels and time taken in each process is captured in ERP .

### Final Conclusion and out-come

After going through the micro analysis of the different phases of six sigma it is concluded that the complete process of re-export can be completed within much less time as compared to the existing time taken in the whole process.

As we came to know that the average time taken by re-export process is around 60-days which is much more than the logical prescribed time of 28-days.

Although after our recommendations, we have been able to reduce this time to a great extent.

#### **This reduction in time is shown here:**

Although after inducing the derived technique a drastic reduction will be observed as below.

RMA receiving from Supplier-----**6 days**  
Documents handed over from Stores to Commercial-----**5 days**  
Correct Documents handed over from Stores to Commercial-----**4 days**  
Preparation of Application-----**1 day**  
Applying the Permission-----**1 day**  
Permission grant-----**3 days**  
Preparation of Documents----- **3 days**  
Send the documents to F/F-----**1 day**

Receiving the Shipping Bill from F/F-----2 day

Dispatch of material-----2 day

**Logical time taken for each activity considering one after another the whole process will take = 6 + 5 + 4 + 1 + 1 + 3 + 3 + 1 + 2 + 2 = 28 days.**

Since some of the process can run simultaneously and after going through CPM analysis the maximum time take will not be more than = 25 days

So for the whole process of re-export it is easily claimed that we have reduced the time by 60 – 25 days = 35- days

### **Proportionate reduction in Inventory**

Major segment of stock maintenance i.e. Inventory on hand is dependent on the lead time of the material and if the lead time is reduced by the half of existing time then in same proportion inventory will be reduced.

**Safety stock = (Max Daily usage-Avg daily uses) x Lead time**

**Re-order Level= Safety Stock + Avg daily uses x Lead time**

So the total saving on the Inventory after this breakthrough improvement there will be 58% on inventory investment, it will improve the cash flow in the same ratio, apart from direct saving of 58% there will be indirect saving of inventory carrying as well as insurance will be apart from this 58% saving.

**With Regards**

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