

“Method Study at Corrugated box manufacturing industry: A Case Study”

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Abstract— In present scenario with increasing of global economic competition, small scale industries have known as an economic growth engine and a tool for employment so they have important role in growth and development of countries. Simulation is a very helpful and valuable work tool in manufacturing. It can be used in industrial field allowing the system's behavior to be learnt and tested. Simulation provides a low cost, secure and fast analysis tool. It also provides benefits, which can be reached with many different system configurations. In my paper, a generalized model is developed for process optimization of small-scale industries for competitive production within the acceptable quality level of production. It is observed that most small-scale industries do not lend themselves to flexible production processes, therefore making it difficult for them to optimize production.

Keywords- small-scale industries, process optimization, manufacturing, modeling, simulation.

1. Introduction:

Small industrial units are industries with limited scale of manufacturing operations, producing a product or few products with limited levels of employment and investment and are many in number than large scale industries. In many developing countries, the roles of these industries are crucial as they provide employment to a large number of people. Breaking the size barrier (limited levels of employment and investment) is a measure of success of the small-scale industries. Small-scale industries are dependent for their equipment and process technology on a limited number of resources that start with:

- (a) The entrepreneurs' own technical expertise probably gained during earlier stages of paid employment.
- (b) Large firms that provide the technology as a component within a sub-contracting arrangement.
- (c) Government institutions desirous to support a measure of indigenous Technology.

The demand for the products of small-scale industries is crucial to their growth. Therefore this work focuses on process re-engineering of a small-scale industry for economical and competitive production.

For this purpose modeling of complex systems such as manufacturing systems is an arduous task. Simulation has gained importance in the past few years and allows designers imagine new systems and enabling them to both quantify and observe behavior. Whether the system is a production line, an operating room or an emergency response system, simulation can be used to study and compare alternative designs or to troubleshoot existing systems. With simulation models, how an existing system might perform if altered could explored, or how a new system might behave before the prototype is even completed, thus saving on costs and lead times.

For these investigation and simulation I have chosen the corrugated box manufacturing industry. Because cardboard packaging is one of the most widely used form of packaging.

And also corrugated cardboard is stiff, strong and light in weight material made up of layers of brown craft paper. These brown craft paper rolls are transported to a corrugation machine where this paper gets crimped and glued to form corrugated cardboard called as single face corrugated board and then this single face corrugated board is cut according required dimension on the cutting machine. According to requirement by adding another corrugating medium and a third flat liner creates a double wall corrugated board or triple wall corrugated boards on gluing or bonding machine.





Then these card boards are transferred to creasing and cutting machine where extra material is removed and creasing operation is performed(i.e., from where the box get folded).



The next operation is slotting operation and finally with stitching operation corrugated box is manufactured.

2. Objective:

- To find out an optimal production line process.
- To minimize the process time.
- To formulate the optimize model for different variables.
- To formulate the input and output model of system

3. Literature Survey:

[1] A generalized model was developed for process optimization of small-scale industries for competitive production within the acceptable quality level of production. It was observed that most small-scale industries do not lend themselves to flexible production processes, therefore making it difficult for them to optimize production when there are fluctuations in prices of production inputs. [2] Simulation is a very helpful and valuable work tool in manufacturing. It can be used in industrial field allowing the system's behavior to be learnt and tested. Simulation provides a low cost, secure and fast analysis tool. It also provides benefits, which can be reached with many different system configurations. Topics to be discussed include: Applications, Modeling, Validating, Software and benefits of simulation. This paper provides a comprehensive literature review on research efforts in simulation. [3] Based on a field investigation of 399 small - scale industries in three Indian states, i.e. West Bengal, Haryana and Maharashtra, collected during April - June 2000, the present paper analyses the pattern of awareness, acquisition

and adoption of technological changes in small - scale industries. It also examines possible constraints of non - adoption of improved technologies. The pattern of use of various components of Information Technology (IT) by small entrepreneurs is also discussed. Following a broader definition of technological changes, the paper identifies major causes that are inhibiting the adoption of improved technologies and examines the role of existing policies and programmes in overcoming them; it also analyzes the present procedure for availability of finance to SSI units for upgrading and modernizing their technologies and suggest measures for facilitating such services to small - scale entrepreneurs; further it evaluates the requirements of improvements in skills, education and training both of entrepreneurs and workers among the SSI units to absorb and implement technologies in their diverse manifestations. Rural urban contrasts are brought out markedly while discussing these issues.

For the critical analysis of existing system method study is best tool. In which various charts such as Man/Material charts, Man and Machine charts are prepared which are available in standard format in Introduction to Work Study by International Labour Office, Geneva. The success of the whole procedure depends on the accuracy with which facts are recorded, because they will provide the basis of both the critical examination and the development of the improved method.

4. Problem Identification

It is observed that most small-scale industries do not lend themselves to flexible production processes as well as due to inefficient utilization of floor space the sequencing of machines are not in proper order and these results in greater process time.

5. Experimentation

The first step to minimize this problem is the critical analysis of the system. For the critical analysis Method Study is the best tool. In the method study various charts charts such as man charts and man and machine charts are prepared for all the workstations.

Chart No.	Sheet No.	Of	Summary					
			Activity	Present	Proposed	Saving		
Subject Charted:			Operation ○	10				
			Transport ⇄	3				
Activity: Corrugation formation machine			Delay □	1				
			Inspection □					
			Storage ▽					
Method: Present			Distance(m)					
Location: M/S Shell Packagers			Time(man-h)					
Operatives(S):		Clock No.	Cost	Labour				
Charted By: A. R. Narkhede		Date:	Material					
Approved By:		Date:	Total					
Description	Qty	Distance (m)	Time (min)	Symbol			Remarks	
From workstation to storage area	2	6	54sec	○	⇄	□	▽	
Raw material from storage transported to workstation		6	4min 54sec					
Unload the shaft			1					
Roll of kraft paper load on shaft (Plain paper)			3min 33sec					
With the use of brush			1					
Loading roll with shaft on machine			1min 45sec					
Delay			2					
Unload the shaft			1					
Roll of kraft paper load on shaft(for corrugation)			3min 23sec					
With the use of brush			1					
Loading roll with shaft on machine			2min 10sec					
Feed the two papers on machine			30sec					
Machine start								
Corrugated sheet transferred to sheet cutter	1	0.5	2sec					

Flow Process Chart				Man Type			
Chart No.	Sheet No.	Of	Summary				
Subject Charted:			Activity	Present	Proposed	Saving	
Activity: Sheet cutter			Operation ○	3			
Method: Present			Transport ⇄	3			
Location: M/S Shell Packagers			Delay □				
Operatives(S):			Inspection □				
Clock No.:			Storage ▽	1			
Charted By: A. R. Narkhede			Distance(m)				
Date:			Time(man-h)				
Approved By:			Cost				
Date:			Labour				
			Material				
			Total				
Description	Qty	Distance (m)	Time (min)	Symbol			Remarks
Setting the required dimension	1		1min 20sec	○			
Sheet from corrugation machine		0.5	2sec	⇄			
Cutting operation			1sec	□			
Collecting sheets at other end				▽			
Storing			4				
Transportation of sheets to stoarge area	1	1	1min 45sec				
Return to workstation	1	1	15sec				

Chart No.				Sheet No.				Of				Summary			
Subject Charted:			Activity	Present	Proposed	Saving									
Activity: Stching machine			Operation ○	1											
Method: Present			Transport ⇄	3											
Location: M/S Shell Packagers			Delay □												
Operatives(S):			Inspection □	1											
Clock No.:			Storage ▽	1											
Charted By: A. R. Narkhede			Distance(m)												
Date:			Time(man-h)												
Approved By:			Cost												
Date:			Labour												
			Material												
			Total												
Description	Qty	Distance (m)	Time (min)	Symbol			Remarks								
Transported from Slotting machine	1	1.5	1	○											
Loading sheets manually one by one			2sec	⇄											
Stiching operation is performed				□											
Storing the corrugated box			4min 10sec	▽											
Inspecting the corrugated box			40sec												
Transported to outside of plant for sunlight	1	6	3min 23sec												

6. Conclusion

For the problem identification the method study conclude insufficient utilization of floor space the sequencing of machine are analyzed using critical analysis method and from the man chart, decrease process time using proper sequencing of machine. The method study used is appropriate for the study if this nature. The case study reveal the process time can be reduced by proper sequencing of the machines. The work study reveals that the workers are efficient in the skills required for th job and have enough experience on the machine and its application.

7. References

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[2] Motion and Time Study

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