

Inbound Sequenced Fusion of Diverse Management theory like Lean, JIT, TPM, ERP to Eliminate Worthless Element for Superior Productivity in Exhaustive Plant

Subodh Singh^{#1}, Sagar Gupta^{#2}, Y.P. Ladhe^{#3}

^{#1}Subodh Singh M.Tech. Scholar, E-mail: subodh1india@gmail.com, PH-9713279047.

^{#2}Sagar Gupta, Asst. Prof. Mechanical Engineering Department, sargupta4056@gmail.com,

^{#3}Y.P. Ladhe, Asst. Prof, Mechanical Engineering Department, ypl29_ladhe@rediffmail.com
Shri Dadaji Institute of Technology and Science, Khandwa, M.P., India,

Abstract - The paper covers the recent requirements of an industry, this work merging seven major value proofed methods of Industrial Management. This proposed philosophy advice to includes Ergonomics, Plant Layout, Work Place Design (WPD), Enterprise Resources Planning (ERP), and Just in Time (JIT), Lean Manufacturing and Total Productive Maintenance (TPM) for increasing the efficiency of plant. The topic unfolds the method of management which optimized all the work place, man power, material, machines. Evolution and the gradual development of all the five branches of Industrial Management (IM) will lead to increase the productivity and efficiency of the plant. This paper efforts to provide a Practical approach & systematic manner for solution in context of production and manufacturing Industry. The strategy includes some of phases to develop a new and improved productivity by implanting this methodology, with a wish of flow of knowledge and information will lead to surrounded environment and all the sectors for the wellness of humanity.

Keywords - Plant Layout, Work Place Design, Ergonomics, Enterprise Resources Planning, Lean Manufacturing, Just in Time and Total Productive Maintenance.

INTRODUCTION

It is tending to develop a systematic procedure for improving productivity and increasing the efficiency of plant with the help of predefined methods as like Plant Layout, Work Place Design (WPD), Ergonomics, Enterprise Resources Planning (ERP), Lean Manufacturing, Just in Time (JIT) and Total Productive Maintenance (TPM). There is number of research's available for each of techniques but no one involving such a relation among the various concepts and very few of researches are presenting detail activities at deferent phases of industrial work, also there is space for the practical concept and simultaneously implementation. Hence, it is a strategic method between all this relative approaches and describes supporting method of the new and improved concept. Further, an implementation procedure of the concept is being provided. We can easily find In previous research a lot work for improvement to reduce or recycle primary wastage which are generated from the industries like as solid waste (Scrapes, paper mills solid waste, cement n fabric mills bio mass) liquid waste (Polluted water, chemical) and also these wastages are suggested to convert in useful means like as electrical energy, heat energy, bio-mass fuel etc, these all effort done to minimization of primary wastages. But there are some another type of wastages involved in production process of any industry, in this paper these wastages are being termed as secondary wastages. In fact, these secondary wastages are more responsible for plant losses and are the more causable barriers for plant profitability and optimization, compared to primary wastages. This paper investigates systematically on secondary wastages & logically discuss for solution. It has been observed that the solution is possible by using pre-existing techniques Plant Layout, Workplace de-sign, Ergonomics, Lean, Just in Time (JIT) & Total Productive Maintenance (TPM) being explained systematically. IJERGS staff will revise and reformat if required.

TECHNOLOGIES INVOLVED

This methodology analyze and increase different physical values for manufacturing and production plant efficiency. It is also known as Planning and Layout designing. The ability to design and operate manufacturing facilities that can instantly adapt to changing technological development and market requirements is becoming increasingly important to the success of any running organization. Objectives of plant layout are to provide better quality products at lesser costs/optimized production to the consumers. To be most effective and optimum utilization of available floor space. To minimize waste and obstacles in different production processes thereby avoiding the accumulation of work at preferable point. To achieve economies in handling of raw materials, work in- progress and finished goods. The workplace today is the result of historical innovations that were designed to make the workplace a productive environment. However the world of work constantly change designing that once were helpful are adding less value than they once did. Ergonomics (or human factors) is the scientific stream concerned with the understanding of interactions among humans and other

elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance. Enterprise resource planning (ERP) is business process management technique that follows an organization to use a system of integrated applications to manage the business and automate many back office functions related to technology, services and human resources. Lean manufacturing is a business model and collection of tactical manufacturing and strategically that emphasize eliminating non-value added activities (waste) while delivering quality products on time at least cost with

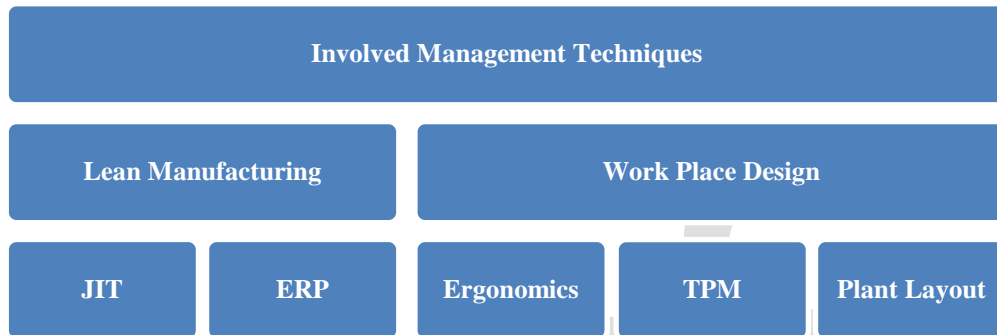


FIGURE – 1: INVOLVED MANAGEMENT TECHNIQUES

better efficiency. Just in time is a type of operations management approach which originated in Japan in the 1950s. It was adopted by Toyota and other Japanese production units, with excellent results: Toyota and other companies that adopted the approach ended up raising productivity (through the elimination of waste) significantly.

Total productive maintenance (TPM) is a system of maintaining and improving the integrity of production and quality systems through the machines, equipment, processes, and employees that add business value to the organization.

PHASES OF TECHNOLOGIES

This method having three Phases:

Phase 1 - Plant Layout, Work Place Design

Phase 2 - Ergonomics, Enterprise Resources Planning

Phase 3 - Lean Manufacturing, Just in Time and Total Productive Maintenance

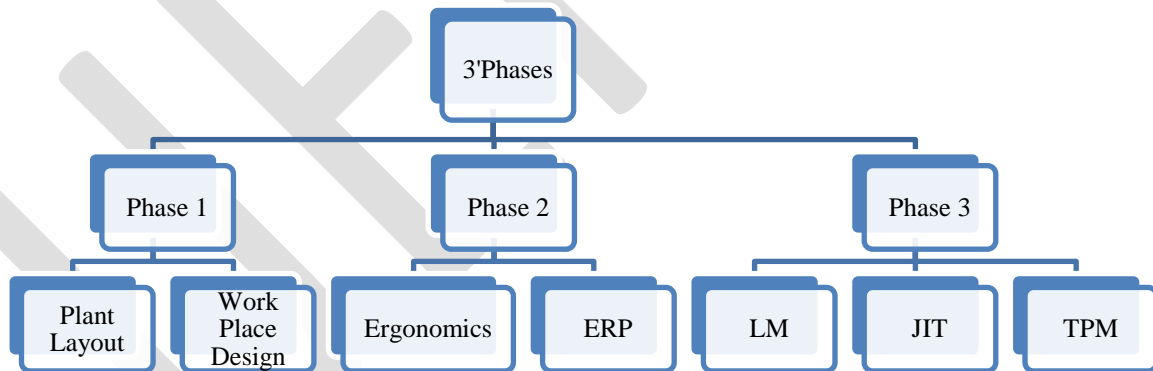


FIGURE – 2: REPRESENTING THE PHASES OF TECHNOLOGIES

METHODOLOGY

In spite of the fact that a lot of improvements has been achieved by use of computer & automation efforts with modern industrial management techniques like as Just in Time & Total Productive Maintenance Lean but still a large amount of wastage is involved in manufacturing and production process. In this paper we recognized this fact & develop the methodology nearly focused on Indian Industry. The Paper is completed in three main phase that lead reduction of wastages during mass manufacturing operation by excellence interrelation of Plant Layout & work place design With Ergonomics and simultaneously use of Just in Time & Total Productive Maintenance. Flow of method will go through three major phases and these three major phases are having their own sub-phases for the ease implementation of this method. This method run from the very starting point from the start to three phases. The

first phase will belong to highly accurate and efficient implementation of the Plant Layout and Work Place Design according to the capital. The second phase will be applicable after the first implementation this includes Ergonomics and the Enterprise Resources Planning for the overall plant that covers all the sectors of the plant. The third and last phase will belongs to another and most important implementation of Lean Manufacturing for the efficient production and the Total Productive Maintenance to avoid breakdown of machines.

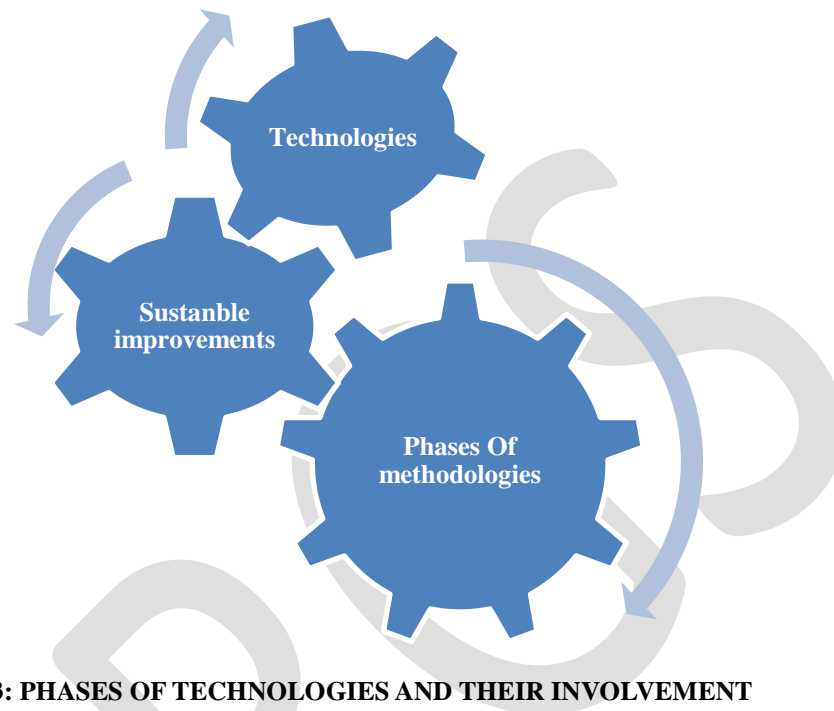


FIGURE - 3: PHASES OF TECHNOLOGIES AND THEIR INVOLVEMENT

As we have a strong belief, if in an industry we reduce or finished kinds of wastages then ultimately it will increase plant efficiency, productivity and profitability. There is three broad (main) phases are described for elimination of wastages by adequate review and interrelation of pre-existing techniques. Like Plant Layout, Work Place Design, Enterprise Resources Planning, and Just in Time, Lean Manufacturing and Total Productive Maintenance. The methodology supporting to overall organization activity from employees attitude to approximate all process of production, At the same time special attention to sub activity of process and development of a business strategy that harness all of company resources to achieve world class Quality at reasonable costs & easy reach to Customers.

In very first phase first sub-phase and second sub-phase will take place respectively of Plant Layout and Work Place Design for the wastages relating to material handling and transportation are reduced by efficient plant layout. It will help to reduce unnecessary effort by the help of Work Place Design.

In Second phase first sub-phase will take place for wastages regarding man power (operator and helping hands) Physical load, mental load, and perceptual load minimization and establish a comfort relation among man, material and machine by work place design according to ergonomics rules.

In Second phase second sub-phase will take place Enterprise Resources Planning for the plant can use to collect, store, manage and interpret data from many business activities, including: Product planning, cost. Manufacturing or service delivery. Marketing and sales.

In Phase 3 wastages involve in production process activity are eliminated by an adequate review and interrelated combination of lean production, Just in Time and Total Productive Maintenance.

The first sub-phase in Phase 3 will work as Lean production is applied to improve value adding activities n to eliminate non value adding activities.

The Second sub-phase in Phase 3. Then Just in Time is implemented for reduction in 7 Types of involve in production.

1. Waiting time.
2. Transportation relating waste
3. Inventory wastages.
4. Waste of motion.
5. Error n defects in product.
6. Extra over production
7. Process waste by DFT (Design for Manufacturing)

The Third sub-phase in Phase 3 At last strongly build up Total Productive Maintenance system for reducing equipment machinery

stoppage chance or break down time. Total Productive Maintenance reduces wastes related to accident, disasters, health, safety, environment hazardous. Total Productive Maintenance support plant better quality more quantity and customer satisfaction.

There is three broad (main) phases are described for elimination of wastes.

In the first phase-Subparts will take place respectively of Plant Layout and Work Place Design (WPD).

In second phase-Ergonomics and Enterprise Resources Planning (ERP) will take place.

In Third Phase: Lean production, Just in Time and Total Productive Maintenance used.

First sub-part of Phase third will work as Lean production is applied to improve value adding activities and eliminate non-value adding activities.

Second sub-part of Phase third. JIT to reduce seven types of wastages involved in production.

Third sub-part in Phase third. At last strongly build up Total Productive Maintenance (TPM) system for reducing equipment machinery stoppage chance or break down time.

IMPLEMENTATION OF PHASES

Barriers in implementation of suggested methodology & techniques and respectively encountering points are given below.

Barriers – 1 Lack of awareness in workers and as well in some management members about LM production system and practice.

Solution: Awareness towards lean methodology and practicing system in shop floor.

Barriers – 2 Production team has not union vision to reduce delay and miss arrangement of working process.

Solution: Train the team to work together as a team and develop a support system which provide mental & moral status improvement to the team.

Barriers – 3 Dependence on traditional system of work management and lack of dare for new experiment s and local level research.

Solution: providing stage for new thoughts coming from different level of organization and appropriate motivation to encourage the successful experiments & research.

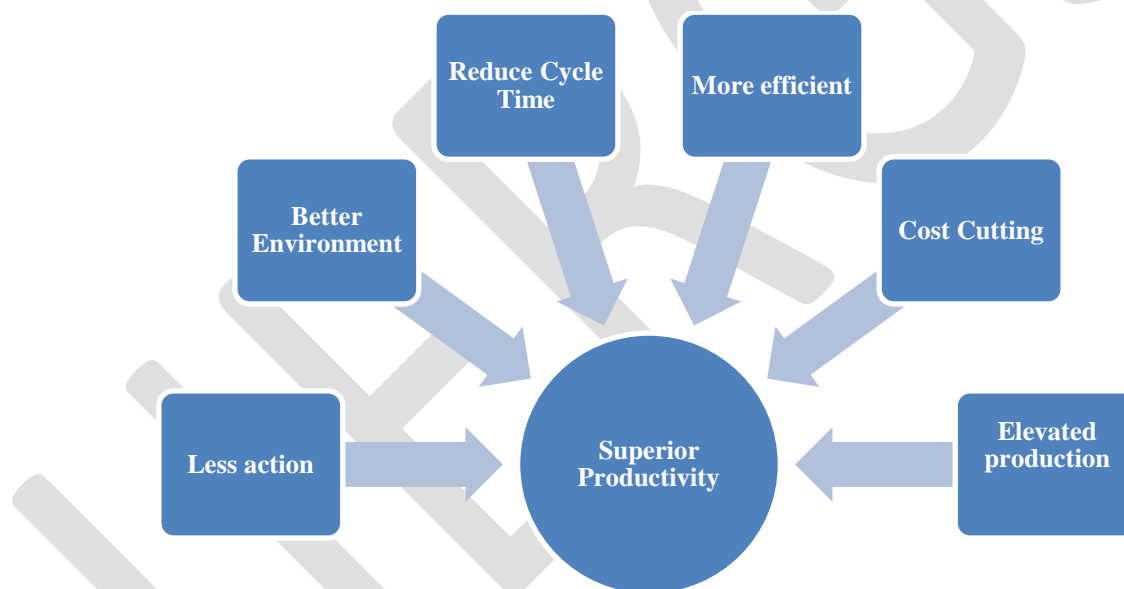


FIGURE - 4: SUPERIOR PRODUCTIVITY ELEMENTS

Barriers – 4 Lack of trend systematic supervision.

Solution: periodically seminar to clear vision and avoid miss concepts.

Barriers – 5 Lack of cooperation among the departments and personal conflicts.

Solution: Top management should make effort for a healthy working environment make believe in subordinates they can get benefits only in case of overall profit of organization.

Barriers – 6 Lack of proper communication among top management, staff and workers.

Solution: faith generation among all levels of employees and make them understand at the last we all have same target to achieve.

Barriers – 7 Different departments have different response level for utility of LMP as for example generally it has been seen that Q.C., Planning, Sales & R&D better in application of LM compare to HR, Production, Maintenance and purchase.

Solution: Initiative member searching and giving them responsibility for same in different departments.

Barriers – 8 Bottle neck in some assembly lines of manufacturing or testing create problem for TPM.

Solution: By OEE (Over all Equipment Effectiveness) and OPE (Over all Plant Effectiveness) analysis bottleneck is encountered which support to a strong TPM.

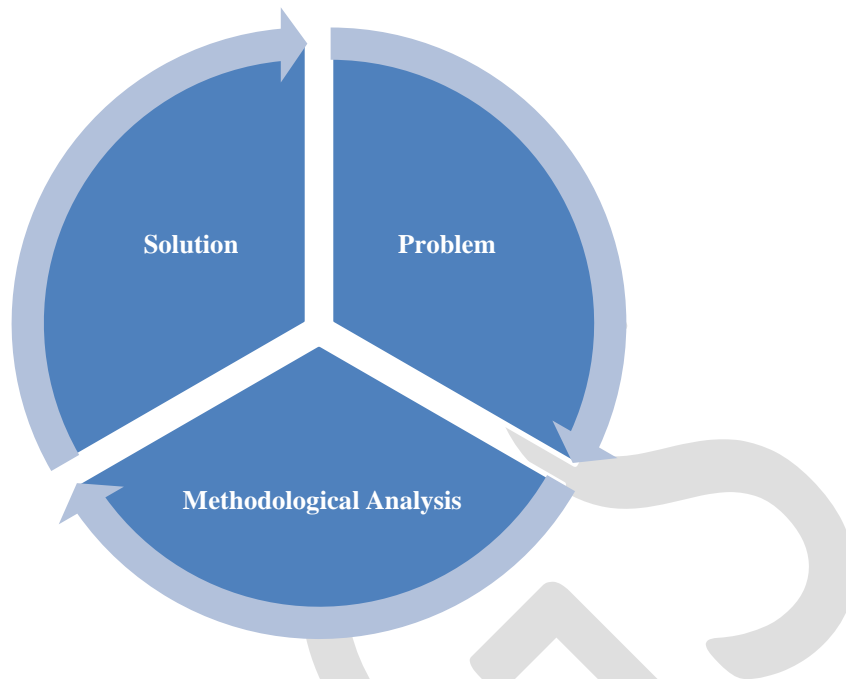


FIGURE - 5: SOLUTION CYCLE OF METHODOLOGY

Ergonomics is not the subject which importance and profits are generally known to employer so some time they don't permit management to wear the expenses for required change in infrastructure and facilities of company according to ergonomics consideration.

Solution: The owner and top management must study and step wise experiment conduct to get positive results and improvement in plant efficiency, it can start with little capital and simultaneously profit can be observed.

In Indian micro and small scale industry actual benefits from JIT is not being achieved because the vendors and small parties related to the company performance like as transportation service, supplier, labor contractor etc. are not familiar and habitual with profits and working system of JIT so the particular company doesn't get the required cooperation and not able to perform as expectation of world level customer.

Solution: Following steps should be follow:

- A. One by one each related party should be noticed to work according to required JIT system including provide them a format of working system and then Regular feedback should be collected
- B. If any disturbance or problem found then discuss with relevant party
- C. Identify & define the problem
- D. Analyses for route cause of problem
- E. Collect views for solution from different level of participant involve in particular related activity.
- F. Select the best solution and modified if required.
- G. Implement suitably as well possible in practical manner.
- H. Take the observation of changes decide implement procedure practice is proper or not.
- I. If results are satisfactory then continue it, otherwise start again from step (D) and follow up to (H)

Process layouts provide cost cutting in human resources, as employees can more easily work with their profiles and designed to increase economies and allowing particular processes to work more efficiently. It Lowers total material handling cost, Less work in processes, Better utilization of men-machines systems, Less floor area is used for storage, Better production control, Production cycle time can be reduced.

Ergonomics reduces costs with the help of ergonomic it can reduce risk factors, Ergonomics improves productivity, The best ergonomically designed job will perform in less effort, fewer actions and better elevation and environment will be more efficient, Ergonomics improves quality, Poor ergonomics leads to reach fatigue point of workers that don't do their work, Ergonomics improves better employee management in work, Ergonomics provides a clean and safe environment to work.

Total Productive Maintenance lead to Productivity Improvement in this Productivity is improved by less losses, Total Productive Maintenance also provide Increased Plant Reliability and Customer Satisfaction it leads to quick delivery to customers, Total Productive Maintenance also works on Cost Reduction in this the cost is reduced because the losses will reduce. Total Productive

Maintenance provides Improved working environment in this Clean working conditions provides a good health and good health lead to increase productivity, Total Productive Maintenance allows to Quality Improvement in this Quality is improved as an outcome, that leads lesser breakdown and defects in production.

Just in Time improves quality and Inventory Control eliminates waste and in the process, improves Exhaustive Plant efficiency. Just in Time improves flow of goods and reduces cycle time, in overall manufacturing process there is a better flow of goods, because there is no over-production of any one item. Labor Costs Are Reduced Through production of goods only when required staff are not paid for non-production, thus saving the company costs. Usually staff will be deployed into other areas of work, so that they will still earn money, but the company saves because it is not paying workers to produce items that have no immediate use. Lean invokes a culture that is very much focused on quality and this culture can become a real driving force within the personnel of any company, which also spins off into JIT being viewed as a positive way of keeping the company financially viable and ahead of its competitors.

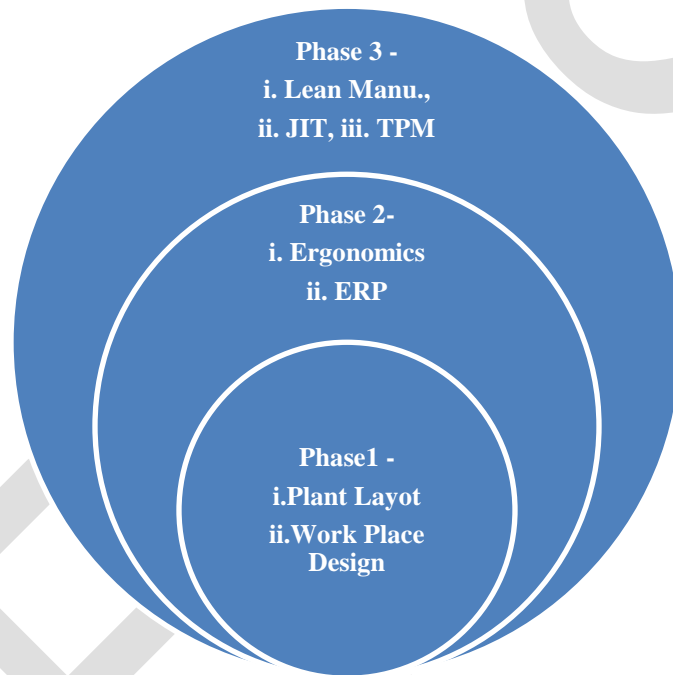


FIGURE – 6: RELATIONS INVOLVED IN METHODOLOGY

ERP streamlining processes and workflows will work in one subsystem, reduce needless data entry and it shares information over the area, establish method that are based on appreciate best business practices, improved workflow and performance, improved customer satisfaction based on improved on-time delivery, Track actual costs of activities and perform action based costing, Provide a consolidated picture of sales, inventory and receivables, increased quality, reduce delivery times, Reduced inventory costs resulting from great planning, tracking and forecasting of requirements, Turn collections faster based on better clarity into accounts and fewer billing and/or delivery errors, Decrease in vendor pricing by select better advantage of quantity breaks and tracking vendor performance.

A lot of the activity in lean conditions is geared towards improving quality. As quality issues occur, problem-solving techniques are used to root cause the query. From there, error proofing is put in place to stimulate the process and prevent recurrence. As a result, the quality of your product will be improved. Easier to manage the work instructions and standardized work let people know what they have to do and when. This makes managing an area much easier. And problems will still arise. Improved Visual Management another benefit of lean manufacturing is supervision by eyesight. If done correctly, your plant will be set up so you can judge an entire area with a visual investigate. Any irregularity will stand out and be easy to identify as a query. Total Company Involvement lean is meant to involve the whole company. It is not intended to be put into action in only one area. It is a management theory which should include every part of your organization. This helps promote the concept that everyone in the company is part of the team. Increased efficiency Line balancing will guarantee each person in the process is working in the most efficient way. Standardized work will assure they are doing it perfectly following the same process every time. This drives to repeatability and enhanced efficiencies. Manpower reductions one of the major advantage of lean is getting more done with limited people. With standardized work and increased efficiencies, the

ability to do the job with limited people becomes a very extremely possibility. This does not mean you have to transfer these people to the unemployment queue. The concept of lean would have these freed-up people utilized to perform further kaizen activity, training to improve skill level, or maintenance of the system once it is executed. Problem Elimination lean manufacturing drive you to tackle an issue and continue to investigate it until it has been eliminated. Root cause analysis and cross-functional teams are utilized to ensure a query receives the level of attention it deserves to correct it. Reduced Space as part of the waste reduction process, space will be created. Modification of finished and raw inventory will save space vertically in your racking as well as horizontally across your workplace. Improved employee morale this is a benefit that may not be realized during the initial stages of your implementation. The reduction of uncertainty in the workplace, as a result of lean, will reduce pressure in your organization members and lead to improved employee morale. Safer Work Environment visual management and helps identify when things are out of position. When unnecessary elements are removed from the operation, the workplace grows much more organized and an organized work environment is a safe work environment.

RESULT AND DISCUSSIONS

For Indian industries especially for mini and micro scale industries are not explored as per requirements of world level competition. These industries are not reaping out the actual profit by Lean practice due lack Advance Education, proper training and guidance. In this paper a frequency approach is delivered to direct justification of origin point of real problem and respectively the proper problem-solving technique is suggested. This pattern will help to industry system to solve problem in less time by less effort. We realize that if an organization use such concept and regular observations are taken for implementation then progress in overall growth of organization is possible.

CONCLUSION

This paper presents an integrating techniques Plant Layout, Work Place Design (WPD), Ergonomics, Enterprise Resources Planning (ERP), Lean Manufacturing, Just in Time (JIT) and Total Productive Maintenance (JIT). This method is a set of techniques that are unique to each of the three phases. This study is joint implementation of different techniques. Each phase of our integrating method represents a different aspect of improvement initiatives aimed towards product, process, plant development and plant management. While this study provides a basic for examining - Plant Layout, Work Place Design(WPD), Ergonomics, Enterprise Resources Planning(ERP), Lean Manufacturing, Just in Time(JIT) and Total Productive Maintenance(TPM) within a single technique and our results suggest that implementation of this method practices can reach to maximum productivity and efficiency of the overall plant.

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