

Change Management in a Lean Manufacturing Environment

Manoj Kr. Agrawal, Surender Kumar

Abstract - Today change is normal. How the industry deals with the change can mean the difference between success & failure. The overall improvement depends upon the implementation of a prioritized change programme, with concentration of effort on change projects, a few at a time, and with frequent measurement of results to determine the extent to which success was being achieved. Managers and executives must be trained for the same. After giving a brief about the change trilogy, change cycle and stages of acceptance, the paper highlights a proven path an integrated approach that identifies an improvement cycle, in order to achieve maximum output after implementing a project for improvement. Before launching a new effort, it is important to evaluate what's working well today, what is not and then to recommend what the correct actions are for improving the company/ professional practice. The concept and hazard of neutral zone which is time of great uncertainty and fear has also been explained briefly along with success ratio and dynamic stability. A case study of change management has been discussed.

Keywords: Change, improvement, neutral zone, change trilogy, change cycle, proven path.

I. INTRODUCTION

Change is a natural process. The mantra, “change or perish”? Like many corporate clichés happens to be true. Future is going to present even greater changes. In competitive environment of today, many manufacturing industries are implementing LEAN, AGILE, MRPII, JIT, CIM, FMS, KANBAN, TQM and other techniques to improve business competitiveness by increasing customer satisfaction, cash flow and productivity. While the theoretical benefits are enormous, very few implementations achieve their potential because of a failure to manage the changed process. How the industry deals with the change can mean the difference between success and failure. Successful management of change requires a clear understanding of the factors involved and effective planning to control the levers of change. Unfortunately, most of the leaders of a manufacturing industry have not been trained in the management of change. To be effective in a world class environment, managers must develop an understanding of the change process, and must master the skill involved in introducing and implementing change. Skills must be developed in anticipating the need for change, rather than simply reacting to changes others are making. Skills must focus on preparing the organization for change. Significant efforts must be made to develop new approaches to managing the organization while it undergoes major change processes.

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Manoj Kr. Agrawal, Assoc. Prof., Department of Mechanical Engineering, GLA University, Mathura, (U.P.), India.

Surender Kumar, Dean (R&D) & Professor, Department of Mechanical Engineering, GLA University, Mathura, (U.P.), India.

Finally, new orientations to stabilising the organization after a change, while simultaneously making it ready for the next generation of changes, must be developed. Most change efforts do not fare so well as the change initiatives start with great enthusiasm, visibility and upper management support, but often die out long before the goal is reached. A common mistake people make when managing change is to assume that there is adequate commitment. In fact the commitment is actually far too weak to withstand the challenges of change. Another is the failure to measure and feedback tangible preliminary results and benefits of the change, while the change is still being established. Aim should be to focus an organization the change objective, sustain commitment to the change effort, overcome the inevitable resistance and practical hurdles, keep the implementation on track, and reach the point where the change itself becomes the normal and it's benefits are tangible.

II. CHANGE IN INDUSTRIAL AND LEAN OUTLOOK

All in all, push and pull on industry will surely lead to very significant waste accumulation which necessarily requires elimination or reuse to improve the overall efficiency of the industry; hence a change in our outlook and practice is becoming very essential. The questions that arise in this context are:

- Competitive pressure push
- Emerging technology push
- When to change
- How to change
- How to cause change
- Where to change
- What to change
- How to promote change so that the improvement cycle repeats
- Creating the environment for change
- Challenging past practices and excuses
- Removing the barriers and road blocks
- Rewarding the right things so that change continues to evolve.

Waste exists in all work activities; all process tasks, and at all levels in the organization. Challenging past practices and excuses involves, to a large extent, understanding the sources of waste and minimizing these wastages by implementing a change process.

III. CONTINUAL IMPROVEMENT & DYNAMIC STABILITY

Continual improvement refers to changes that are gradual and incremental as well as changes of a more dramatic nature. There are two levels at which continual improvement takes place in a factory: the process level and the system level. Process improvement is detailed and narrow in scope,

and system improvement is broad and holistic in scope. Both are necessary if the factory is to benefit from improvement efforts. Process improvement alone cannot produce system wide advantages, and system improvement requires that specific processes within the system be modified. Process improvement is continual and incremental. It takes place on the shop floor with the people who are involved in the specific process. In practice, shop floor workers can improve their own processes without the assistance or involvement of engineers or managers, but there is no reason to exclude anyone who wishes to be involved in the improvement effort. Process improvement focuses on the details and methods of a specific production process. It can include the placement of tools, presentation of material, or arrangement of machines in a work cell. Fixtures or devices that automatically load or unload machines are often installed as a result of process improvement. Process improvement involves scrutinizing how people get their work done, and its goal is to minimize the time needed for material to flow through the area. Activities that do not add value to the product, such as unnecessary walking to get supplies or looking for tools, are reduced or eliminated. Of course, as with any change, the standardized work procedure should be revised. Improvement should not be a special event that takes place sporadically. It should be an ongoing part of the workday. To make sure factory improvement is continual, we recommend a cyclical approach. Figure 1 represents a typical improvement cycle. First a problem or area that needs improvement is selected. Then the root cause of the problem is identified and a possible solution devised. The solutions implemented and tested for effectiveness. If it works, the process is standardized to reflect the new method. If the solution is not effective, the “cause” that was identified is reexamined to make sure that it was truly the source of the problem. Once the true source of the problem has been verified, a new solution is developed, implemented, and tested. After the solution’s effectiveness has been established, the standardize work procedures are updated, and the next problem or area needing improvement is addressed. Change has been with us forever, and it always will be, but the idea of change itself is changing. Change creates initiative overload and organizational chaos, both of which provoke strong resistance from the people most affected. To change successfully, companies should stop changing all the time. Instead, they should intersperse a major change initiatives among carefully paced periods of smaller, organic change- an approach called dynamic stability.

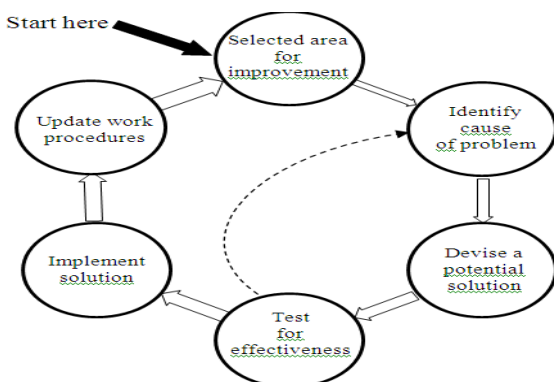


Figure 1. Improvement Cycle

Dynamic stability is a process of continual but relatively small change efforts that involve the reconfiguration of existing business models rather than the creation of new ones. Oscillation between big changes and small changes helps ensure dynamic stability in organizations. More critically, it paves the way for change that succeeds. Achieving dynamic stability is more difficult than ramming audacious changes through an organization. However, dynamic stability has the great advantage of allowing change without fatal plan.

IV. CHANGE TRILOGY – SILENT WAR

Indian industry is indeed engaged in a ‘silent war’. To win it, we must be able to manage the change for improved productivity. Industry must rediscover the powerful effects of an allied effort which incorporates innovation, involvement of all employees and the management of technology. These three simulation efforts, combined with a never ending emphasis on continuous improvement are the primary strategic and technical initiatives which must be used in the silent war. Message is in one of the two forms. How we are managing ourselves into economic decline through the neglect of manufacturing or how to apply the winning techniques to improve our own performance. What is sought today is to move the innovative process out of the laboratories into the centre of the business – into manufacturing. Fig 2, suggests that for successful company, the goal must be continuous improvement, through a combination of innovative ideas and people involved in their implementation, using appropriate technology as needed to win the silent war, companies must transform their operating environments. Employees must understand that continuous improvement is the norm and the change will be part of all operations. Instability must exist within the context of stability.

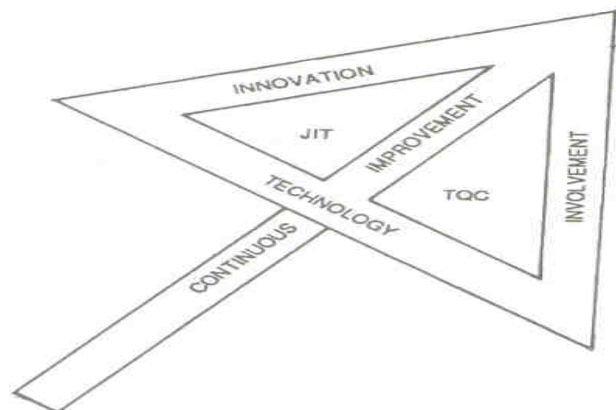


Figure 2. Managing Productivity and Change

V. WHY WINNERS ALWAYS SEEM TO WIN

It is noticed that some of the firms (like some people) come up as winners all the times where many fail. They march into MRP, expand into CIM and it ripples successfully through the whole firm. They take up TQM and the defects fall, they jump into JIT and things flow better. It does not make sense to credit their success to the methodologies and technologies- MRP, TQM, JIT etc. plenty of firms have tried these and failed, or experienced only marginal success/ results. Part of the answer is that these firms never forgot the message.

Three plus one = survival in white water

In today's turbulent economy, three things aid survival, and the fourth is essential or critical.

- I. Read the river- listen to your market.
- II. Know and grow your physical abilities and limits i.e. capabilities – listen to your work force. Assimilate the lessons of philosophy, skill, experimentation and improvement and listen to it's accumulated wisdom.
- III. Master the techniques of maneuvering and righting yourself – listen to the relevant technology.

The fourth essential and critical point is,

- Keep your balance mentally, even more than physically when things get exciting, i.e. keep the above three in balance by clear strategies, measure every system or technology by its support to these strategies.

This demands whole company vision, continuous learning, constant reassessment of system and technologies in support of goals.

VI. STAGES OF ACCEPTANCE FOR LEAN PHILOSOPHY

Change acceptance is a process, which includes the following stages:

Awareness. Awareness consists of the first introduction to the potential change and the initial impressions formed by the stakeholder. An abstract concept of the changed environment is formed. Since project objectives and potential changes are often spread through rumors and half-truths until they are formally determined and disseminated, the potential exists for the awareness phase to extend over a significant period of time. A change implementer must be sure that all stakeholders do not form false concepts and build unnecessary resistance in the later stages of the acceptance process.

Self-concern. The self concern phase quickly follows the awareness phase. During this stage the stakeholder asks, "what's in this for me?". Each stakeholder will project the impact the change will have on his or her environment and begin to form an opinion. Positioning as a supporter or blocker will rely heavily on the stakeholder's thoughts developed during this stage.

Mental tryout. During the mental try out phase, stakeholders begin to process details about the change. Envisioning or mentally walking through the new environment or process is the key indicator that someone is in this stage of acceptance.

Hands on. At the hands on phase, stakeholders actually walk through the new process. They are exposed to the details and can see the impact the change will have on them. The last barriers to acceptance are exposed at this point, and the change integrator must identify and resolve them. These barriers may not have been objectively formed by the stakeholder and may reflect a failure by the stakeholder to perceive a win result in the change.

Acceptance. Once the final barriers have been mitigated, acceptance will follow. Unless the stakeholder perceives the result, this acceptance may be less than enthusiastic. Notice that each stage has a cumulative effect of stakeholder buy-in. their perception of a win result is building and reassured

through these stages unless a net obstacle is not overcome. Figure 3 summarizes the stages of the change acceptance process

VII. CHANGE FORMULA

Change formula is a powerful tool that can help to plan change efforts. It identifies several key factors which must be present in sufficient degree to initiate and sustain a change effort. It is also a diagnostic tool that can be used to quickly assess what is missing or what is going wrong. The difficulty of creating readiness for change may be thought of in terms of the cost of changing to organizational members. Change will occur only when these costs are outweighed by a number of factors which can create positive motivation to change. This relationship between positive forces which support change and the cost of change may be expressed as

$$C_h = D \times M \times P > C$$

C_h = Change

D = Dissatisfaction with the status quo

M = A new model for managing or organizing

P = A planned process for managing changes

C = Cost of change to individuals and groups

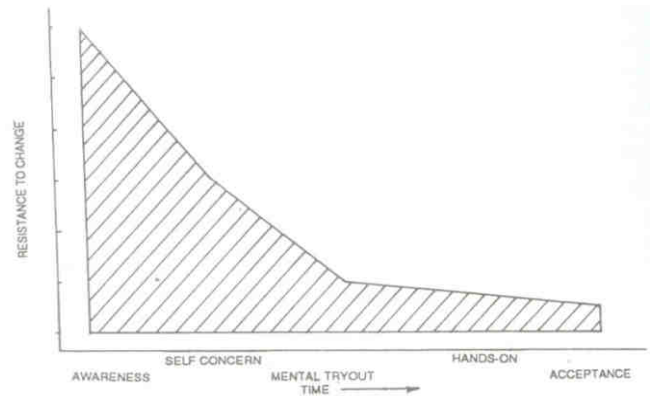


Figure 3. Stages of the Change Acceptance Process

For many purposes, substituting the concept of vision (V) for model (M) is more understandable and approachable. A vision can be thought of as a target to shoot for, or an extended wide angle 'photograph' of what the organization would look like in its new status. The key factors for change are:

The "WHY" (Discomfort). The change will be difficult to implement unless the people who actually have to make the change feel the discomfort strongly. It may be necessary to "raise the level of discomfort" before people choose to support the change. Organization does not take on major changes unless there is very strong felt reason to do so due to the negative external threats.

The "WHAT" (Vision). Along with a sufficient level of discomfort, change effort will need a vision to move toward. The vision can provide a clear sense of direction, as well as positive motive for change. Organization lacking sufficiently clear and compelling vision often tends to waste their precious resources, time and energy.

The "HOW TO" (Process). A well thought out process for the implementation of change. (Which also requires adjustment process for people), has to be prepared. It may include reorientation of their job and perhaps a whole new way of thinking about their activities, career and the industry. Reviewing previous change efforts, pinpointing,

what worked and what did not and why and applying those lessons can improve the probability of success in the current change efforts.

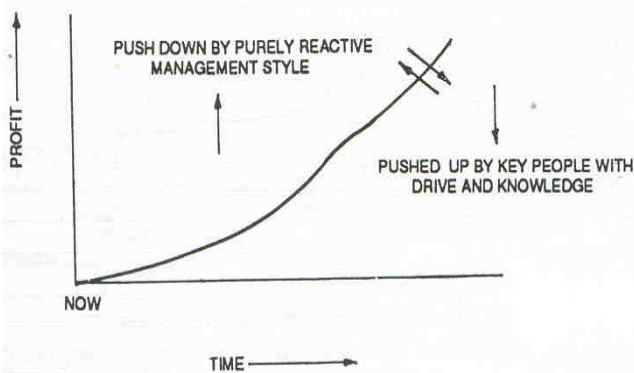
The “WHY NOT” (Cost or Resistance). It includes all forms of resistance to change, which must be overcome to initiate and sustain a change process.

In order to assess whether the situation to make change is favorable or not an overall comparison of:

- a. Major driving forces that exist or could be developed to overcome the restraining forces.
- b. Major resistive or restraining forces that must be overcome to initiate and sustain the change.

Figure 4. Illustrates the forces of change

Figure 4. Forces of Charge



VIII. PARADIGMS AGAINST CHANGE

People’s believe in the technical and professional ranks that bog down the change process includes:

- My profession plays a vital role in the success of the business. I hold a responsibility to do the job I am expected to do and if I accomplish this, I have done all I can to make the company successful.
- My responsibility ends at the point where my tasks have been successfully accomplished and passed on to the next function in the chain.
- My hands are tied with regard to the tasks of other professions (functions) within the organization. I hold no direct responsibility for their success or failure other than to complete my part of the work they need to successfully complete their assigned responsibilities.
- I was educated in a professional field, then hired and trained by the company to perform a relatively clear set of professional duties and functional responsibilities, I may be asked to expand my duties and responsibilities within my function, given appropriate reasoning and/ or remuneration, but I should not be expected to step outside this basic role.
- There is a need for the various professions to work as separate and independent entities. Even functions that are closely related should never be combined.
- Change is good, in fact required, as long as the change does not affect the conventional or traditional way I am expected to do things within my profession.

IX. CHANGE CYCLE

Change cycle is a road map that can be useful in choosing course, anticipating problems and helping keep track. The different stages of change cycle are:

1. **Choosing the target.** (strengthening competitive position, improving product line etc.)
2. **Setting goals.** (closer scrutiny of proposed change, purpose, scope, implementation plan, time duration etc.).
3. **Initiating action.** (individual commitment, collective, capabilities, shift from planning to action).
4. **Making connections.** (talking to others, looking for guidance, support, practical suggestions etc.)
5. **Rebalancing to accommodate the change.** (adjustment throughout the system, rebalancing of functional system relationship pattern and organizational structure etc.)
6. **Consolidating the learning.** (integration and reflection on the project as a whole).
7. **Moving to the new cycle.** (regarding time and completion, one cycle reaches completion and a new cycle may begin for the next change).

The challenges of the change cycle has it’s own purpose and characteristics. In each stage some significant smaller change must take place to propel the cycle forward. The challenges that manufacturing engineering/ management face in implementing change can be broadly put into two categories.

Functional Challenge, which relates to capability and structures of the system while the **People Challenge** includes attitudinal behavioral and emotional response to the change efforts.

X. COST OF CHANGE

Cost of change implies investment of both cash and personnel resources and all programmes require a commitment prior to the benefits being realized. At the company not all the costs were foreseen, but allowance had to be made for the following:

- i. Training for revised work practice
- ii. New plant layout
- iii. New business systems
- iv. Additional people resources
- v. Organizational restructuring

Careful planning of change, with prioritizing of the necessary actions, can significantly reduce the effects of the potential profit dip, as shown figure 5. Table 1 gives an idea for costing an engineering change.

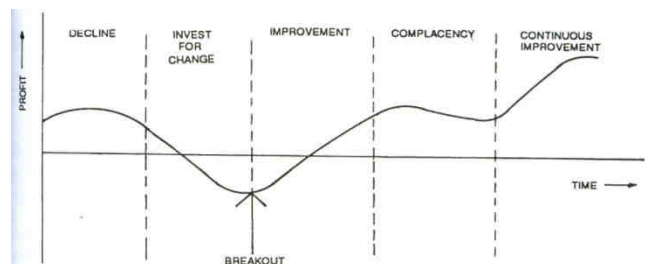


Figure 5. The Process of Change and Profit Dip

Notice that the analysis does not include the cost of surplus or obsolete material dispositions resulting from the change, nor the costs associated with the conversion or scrapping of

tooling and fixture. It is only the direct administrative costs of processing each change to be implemented– a direct drain on the profitability of the organization, never recovered, seldom budgeted, and always detrimental.

XI. THE NEUTRAL ZONE

The neutral zone is a time of great uncertainty and fear. It is like wading through a swamp full of snakes, insects, alligator, and quicksand with no way to see very far ahead. By being aware of the hazards of the neutral zone, one can help the factory to overcome them. There are six dangers of the neutral zone

- Anxiety rises and motivation falls.
- Absenteeism rises and productivity falls.
- Old weaknesses and past resentments resurface.
- Personnel are overloaded and turnover increases.
- People become polarized.
- The organization is vulnerable.

It might seem like the neutral zone should be avoided at all costs! Perhaps it seems much safer to let the factory keep running the old way. However, like the “ending” described above, the neutral zone can be navigated safely by understanding the dangers and taking a few simple precautions. The neutral zone is not simply a difficult phase that must be endured before the factory can operate successfully in its new configuration. The neutral zone is a beneficial period that provides the necessary time for reorientation and redefinition. People need time for the old methods and patterns of behavior to take shape. As progress is made through the neutral zone, people begin to realize they wouldn’t go back to the old way even if they could.

Table 1: Costing engineering changes

Costing the Engineering Changes				
Sr. No.	Function or Activity	Hours Required	Cost/Hour	Total Cost
1	Design Engineering Change			
2	Detailing and Drafting			
3	Design Review Meeting			
4	Checking & Approval Process			
5	Document Control for Lean Philosophy			
6	Document Distribution			
7	Manufacturing Engineering Review			
8	Process Design Change			
9	Tooling Design Change			
10	Quality Planning & Test			
11	Inventory Planning for Lean Manufacturing			
12	Purchase of New Materials			
13	Supplier Costs Exclusive of Materials			
14	Transportation Planning			

15	Receiving Inspection			
16	Material Handling & Storage for Lean Process			
17	Material Issue & Movement for Lean Process			
18	Production Time			
19	Cost of Approvals			
20	Other (Miscellaneous Changes)			
21	Total Cost of the Change			
22	Number of Changes Per Month/Mile stone			
	Total Monthly Financial Impact Per month/Mile stone			

A manager, we must shield people from as much uncertainty as possible while in the neutral zone. We can do this by instituting temporary systems and policies, redefining reporting relationships, and setting measurable and achievable shorter goals. It is also important to give people the opportunity to succeed. If the goals are too ambitious, people will not achieve them and may begin to lose confidence. For example, the neutral zone is not the time to try to break productivity records. Also, people should be given the tools to succeed. It may be necessary to send workers and managers to special training. People may not understand fully what is going on around them, and they may feel forlorn. For this reason, it is important to strengthen interpersonal relationships and feeling of trust and loyalty while in the neutral zone. Top management should communicate regularly, reminding people why the change is necessary, where the company is going, how the company is doing. This information bears repeating over and over at every opportunity.

XII. SUCCESS RATIO

$$Success\ ratio = \frac{Business\ need}{full/active\ employee\ support}$$

The formula pertains to the potential success or failure, management can expect in moving forward aggressively with a significant change. It deals with a thoughtful consideration of business need on one hand and the potential for full and active employee support on the other. Full support would mean no uncertainty or doubt. The interpretation of formula is like this: the business need should always be considered to be 100 percent in other words, something that must be done in order for the company to remain competitive or in some cases just to survive. If it is not 100 percent, then simply forget it! If, in turn, the full and active support of employees is deemed to be 50 percent at best (expressed as 1.0-0.5 = 0.5), then the success ratio would probably be no better than 2.0, on a scale of 1 to 10 (1.0/0.5=2.0), which is obviously a very low potential for success. With this formula you will find that the ratio both increases and depresses disproportionately with the estimated degree of support. While 50 percent only

yields a 2.0 on a scale of 1 to 10, 85 percent still only provides an estimated success ratio that is less than 7, which still is not the best of odds. Conversely, 25 percent full and active support sets forth a success ratio of 1.3, which is certainly still lower than the 2.0 projected for 50 percent support. What this formula uncovers is that you need full and active support of at least 90 percent or implementation of the need is going to be very difficult, unless, of course, you conduct a great deal of persuasive communicating with the work force on the front end. And, even with that, any absolute assurance of success would still remain highly questionable. This does not mean if the success ratio ends up being 5 or even 2, that change should not proceed. It would say, however, that a good deal of communication of how this change will affect employees should precede the change and that employees should have a forum that provides the opportunity for both challenge and debate- until they understand the underlying principles of economical manufacturing and its benefits. But, the fact is, if a leader is not in a position to accept debate and challenge to any change like lean being proposed, then he or she simply isn't ready to lead it.

XIII. CONCLUSION

Most change efforts like lean, agile etc., do not fare so well as the change initiatives start with great enthusiasm, visibility and upper management support, but often die out long before the goal is reached. Aim should be to focus an organization on the change process objective, sustain commitment to the change effort, overcome the inevitable resistance and practical hurdles, keep the implementation on track, and reach the point where the change itself becomes the normal and it's benefits are tangible.

REFERENCES

- [1] Charles Standard and Dale Davis, 'Running Today's Factory' Hanser Gardner publications, Cincinnati, 1999.
- [2] W. J. Hopp and Spearman M.L, "Factory Physics: Foundation of Manufacturing Management," Chicago, Irwin, 1996.
- [3] W. Davis John, 'Fast Track to Waste Free Manufacturing,' Productivity Press, Portland, USA, 1999.
- [4] Michael J. Termini, "The New Manufacturing Engineer", Society of Manufacturing Engineers, Dearborn, Michigan 48121, 1996.
- [5] Kumar Surender, Khan, B.K., "Computer Aided Manufacturing", Satya Prakashan, New Delhi, 2011.