

Six Sigma- An approach to Quality Improvement.

Dilip Chandrakant Shrivastava

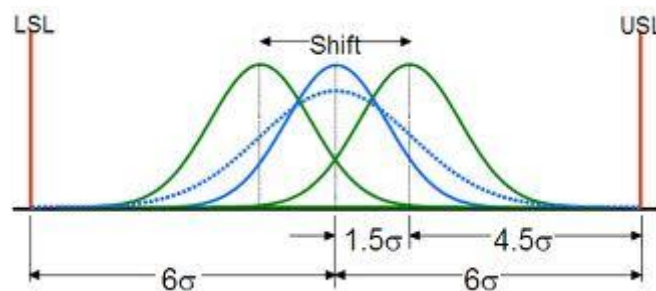
Department of Mechanical Engg, Anjuman College of Engg & Tech Sadar, Nagpur -440001, India

ABSTRACT: six sigma is an approach that improve quality by analysing data with statistics six sigma is an organised and systematic method for strategic process improvement and new product and services development that relies on statistical method and the scientific method to make dramatic reduction in customer defined defect rates. Sometimes the traditional method fails in removing customer defined defect rates therefore there is a necessity of developing such a powerful method that fulfil customer expectation and improve process capability. Six sigma is such a recent technology which helps in improving process capability to a greater extent. First it was developed by MOTOROLA company in mid of 1987's. Six Sigma became famous when Jack Welch made it central to his successful business strategy at General Electric in 1995. This paper review some related literatures to describe basic concept, methodology, sigma levels and DPMO its roll in industry, key factor for successful sixsigma & name of companies that us six sigma. This paper also describe defect per million in various sigma level and its deviation.

I. INTRODUCTION

As we seen that every Organization want to Improve Productivity thereby increasing their profit. India is 4th largest steel producing country around the world. Its use greatly affect the economy of country. Steel is the backbone of any industry because of its use in various sectors such as railway, military expedition, household appliances, infrastructure etc. To bring this raw steel in various form a process known as rolling is necessary. A rolling is the process of reducing thickness of metals by passing it between two or more. There are various forces which affect the quality of product which are rolled. During the rolling operation defect produced are alligating, internal defect etc. Thus it is necessary to improve the quality of the rolled products.

The traditional quality management approach including statistical quality control, zero defect, and total quality management have been key players for many years, while six sigma is one of the more recent quality improvement initiative to gain popularity and acceptance in many industries across the globe.



six sigma process deviation

From "Fig" six sigma refers to a process in which the range between the mean of a process quality measurement and the nearest specification limit is at least six times the standard deviation of the process.

The term six sigma developed by Motorola in 1980's come from the field of statistics known as process capability i.e the ability of manufacturing process to produce very high proportion of output within specification limit. Finally it is a process in which 99.99966 of the products manufactured are statistically expected to be free of defect (3.4 defective parts per million) this defect level corresponds to 4.5 sigma level. six sigma differ from other quality program in its top down drive in its rigorous methodology that demands detailed analysis, fact based decision and a control plan to insure on going quality control of a process.

2. Various Sigma Level

Sigma Level	Sigma (with 1.50 shift)	DPMO	Per cent defective	Percentage yield	Short term C_{pk}	Long – term C_{pk}
1	-0.5	691,462	69%	31%	0.33	-0.17
2	0.5	308,538	31%	69%	0.67	0.17
3	1.5	66,807	6.7%	93.3%	1.00	0.5
4	2.5	6,210	0.62%	99.38%	1.33	0.83
5	3.5	233	0.023%	99.977%	1.67	1.17
6	4.5	3.4	0.00034%	99.99966%	2.00	1.5

3. Methodology Of Six Sigma

There are two main methodology Viz.DMAIC(Define Measure, Analyse, Improve &Control) and DMADV(Define, Measure, Analyse, Design, Verify)

3.1 DMAIC- It is used for project aimed at improving an existing business process.

Key Steps of DMAIC Process-

Steps	Key Process
Define	Define the requirement and expectation of customer. Define the project goals.
Measure	Measure the processed to satisfy customer need. Develop a data collection plan.
Analyze	Analyse the causes of defect and Sources of variation.
Improve	Improve the processes to eliminate variation. Develop creative to eliminate plan.
Control	Control the processed to eliminate variation. Develop proceed variation to meet customer requirement. Develop a strategy to monitor and control and control the improved process.

3.2 DMADV-It is used for project aimed of creating new product or proceeds design.

Key Steps of DMADV Process.

Steps	Key process
Define	Define The Requirement And Expectation Of Customer. Define The Project Goals.
Measure	Measure The Processed To Satisfy Customer Need. Develop a data collection plan.
Analyse	Analyse the causes of defect and Sources of variation.
Design	Design An Improve Alternative.
Verify	Verify the design implement the production process and hand it over to the process owner.

Within individual phases of DMAIC or DMADV Project six sigma utilizes many established quality management tool like (control chart, Pareto chart, Ishikawa diagram) etc. that are also used outside six sigma.

4. Role Of Sigma In Improving Productivity

4.1- Identify the work flow associated with manufacturing product .This include people, process & technology required for production as well as the resources, communication needed throughout the company .Then project manager can prioritize & plan to implement new process to fix known problem .Then document work flow process on paper, or electronically on software by reducing defect rates and eliminating process that don't add value to the end product this can improve manufacturing productivity.

4.2- Track report to analyse financial and customer satisfaction data and share amongst all project manager so they complete the tasks.

4.3- Create a balanced score card based on data form a secure repository. Identity financial measures such as monthly sales customer measure like number of product support calls, process measured such as number of product manufactured each month. This operational data gives idea of our intervention that will successful or not.

4.4- Monitor information generated from process improvement project to implement. Improvement throughout all of manufacturing operation .Analyse cost & benefit create an intranet website to publish report, balanced score card business case studies. Ensure all employees have access to the information and appropriate training on how to implement the procedure to improve manufacturing productivity.

5. Key Factor For Successful Six Sigma

- (1) Management commitments and involvement.
- (2) Understanding of six sigma methodology tools & techniques.
- (3) Linking six sigma to business strategy.
- (4) Project management skills.
- (5) Training of six sigma(master black belt, black belt, green belt) to lead & implement

Six sigma approach.

6. Name Of Company That Use Six Sigma Methodology

TATA steel, Thermax, TATA auto comp. system, L&T switchgear, TVS Suzuki, Samsung, GE, Wipro, patni, LG, TVS Sun dram, Motorola, TOYOTA.

Conclusion

Successful implementation and growing organizations interest in six sigma method have been exploding in the last few years. However there is still the need for more research into six sigma to test new theories or models that have been proposed to strength in the methodology. Implementation of six sigma are directly related with financial result of company because it target the customer delight and new innovative

ways to exceed the customer expectation. Six sigma is prospective methodology as compared to other quality improvement technique as it focuses on prevention of defect rather than fixing it. It is attentive to the entire business process and training is integral to the management system where the top down approach ensure that every good thinking is capitalised and every bad thinking is quickly removed. As six sigma focuses on continuously reducing defect then it vey essential in rolling industry to produce defect free product and effective utilisation of steel. By using this technique we increase the economy and revenue of the country which is important as said earlier in the introduction of this paper. The main limitation of six sigma is training to every individual is necessary that include cost also. While converting the theoretical concept into practical application there are lot to real time barriers which need to be resolved. As far as application is concerned six sigma may be used in banking, medicals, non- manufacturing process to effective utilisation of resources. Another area suggested for future research is the investigation of how six sigma works with other improvement technique.

References

- [1] *S.H Park, six sigma for quality and productivity, asian productivity organisation,1-2-10 ,Hirakawacho, chiyoda-ku, Tokyo 102-0093, Japan*
- [5] *Hongbo Wang "A review of six sigma methodology and future research" 978-1-4244-2108,2008*