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SIX SIGMA IN MANUFACTURING

A CASE STUDY OF REDUCING PRODUCTION WASTE
AND IMPLEMENTATION OF FIVE S

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E-SIX SIGMA

a venture of sAvh Quality Solutions (Pune)



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Introduction

Six Sigma is world-wide renowned quality improvement methodology that mainly works on removing defects from the products, services and the processes across the sectors.

It was invented in 1980's at Motorola company. In its initial application, Six Sigma was limited to Manufacturing & Production industries however with its increasing popularity, it spread to all other sectors.

Today, Six Sigma is considered one of the prominent methods for Quality Management and being used by over 90% of Fortune 500 companies. Almost all National and Multi-National companies use Six Sigma in some or the other way.

Six Sigma has 4 key levels of expertise identified as-

- Six Sigma Yellow Belt
- Six Sigma Green Belt
- Six Sigma Black Belt
- Six Sigma Master Black Belt

Every level of expertise has its own roles & responsibilities in Six Sigma Project Implementation and generally lead by a Master Black Belt.

When integrated with Lean, which is, in simple words, a waste removal method, Six Sigma becomes Lean Six Sigma.

e-Six Sigma (www.esixsigma.in)

e-Six Sigma is a cloud-based Six Sigma Training & Certification Platform accredited by 'Council for Six Sigma Certification (USA)'. CSSC operates in over 165 countries across the world.

It has won a National Award for 'Best Online Six Sigma Training & Certification Platform in India 2017' by India Education Awards.

e-Six Sigma is being loved for its unique value of providing 'practical knowledge' through AWYL i.e. 'Apply What You Learn' activities which are meant to free your hands on the key topics being taught in the chapter (the curriculum for Six Sigma Green Belt is divided into 14 distinct chapters).

It is a brand of sAvh Quality Solutions, a sister concern of sAvh Technologies Pvt Ltd, an ISO 9001-2008 certified company based in Pune. sAvh is a venture by IIM-Alumnus & Ex-Infosys Employee.

sAvh has trained over 1800 students and professionals for Six Sigma Training.

Six Sigma and Manufacturing

The need behind quality improvement was highlighted while second industrial revolution, back in early 1900's where production started in masses serving very large number of consumers. This need of maintaining quality for the mass production gave birth to many inventions in the world of quality.

Even today, many of the Six Sigma tools & techniques being used, were discovered at that time. The tools, with the flow of time, got modernized, enhanced and improved to suit the constantly changing requirements of the businesses especially in Manufacturing & Production.

The basics of Six Sigma are actually designed to improve the performance of manufacturing industry. It was originally developed as a kind of quality control system for mass production. The main purpose was to control the manufacturing process by reducing waste (which is referred to as Lean). Thus the term, 'Lean Six Sigma' comes into the picture.

The companies that early braced Six Sigma were Motorola & General Electric. Post their success, other manufacturing companies, from different domains, like Baxter, Johnson & Johnson in Pharmaceutical; Ford, Bell Helicopters in Automobile; HP, Apple in IT; and some other such as Kodak, Xerox, Honeywell, etc started using Six Sigma for their productions.

Six Sigma was heavily inspired by many manufacturing tools & techniques such as TQC (Total Quality Control), TQM (Total Quality Management), TPS (Toyota Production System), Lean (Waste Removal), ANOVA (Analysis of Variance), Control Charts (To analyse whether a manufacturing process is in statistical control or not), Pareto Chart (80-20 Rule) and many more.

Lean and Six Sigma has already proved their effectiveness in completely renovating the manufacturing & production processes though Quality Control, Defect Reduction, Waste Removal, etc to result into Boosted Process Capabilities.

The prime goal of Six Sigma methodology is to make sure that the manufacturing process has minimum defects. The occurrence of 3.4 defects per million chances is the ultimate goal of this system. Though it seems to be an unachievable task but most of the manufacturing companies achieve this final goal by adopting this technique of producing quality products.

Today, hardly any manufacturing/ production process can be an exception for application of Six Sigma.

Case 1: Reducing Production Waste

This case is about a Paint Manufacturing Unit based in Pune, India. It used to manufacture a variety of paints used mainly in construction sector. Most of the paints were expensive and seek huge production costs.

After completing my Green Belt, I was searching for a Project where I can apply Six Sigma Methodology to free my hands and gain some practical knowledge. So I decided to take it as a pilot assignment to test my skills of Six Sigma.

I never saw a paint manufacturing unit before that so I was very curious about everything. The key mantra for Six Sigma which I learnt was to have keen observation skills which I used there.

However, even after many days of thorough inspection, I could not find any opportunity for improvement. It seemed to me like everything was going perfect and ideal.

One of the machines, where the liquid paint used to get uniformed by rolling a heavy roller on the base of a metal sheet and then the liquid used to get collected in a big bucket kept at one end. It was very simple to see.

After spending over 2 weeks and getting frustrated about not being able to identify scope for Six Sigma, one day, it suddenly stroked my mind, when my mother cleaned up drops of a curry poured on a dining table while serving me a meal. The similar activity was happening in the company.

While rolling the roller over the paint, few drops of that expensive paint used to drop down on the floor, which were later cleaned up by the machine operator without knowing he was actually wasting the expensive paint. The problem was identified.

After applying Six Sigma Methodology- DMAIC properly, we decided to make some modifications in the machine to save those drops being wasted. We wrapped a plastic paper around the machine. We also slower the speed of the roller and trained the operator to change his practice of the activity. We also collected data of how many drops were being wasted until that under different circumstances.

To our surprised, the drop count went up to 72 lacs for a year. In other words, Six Sigma helped the company to save 72 Lacs of drops of the expensive paint. Each drop was containing around 3-4 ml of paint. Further, when we calculated the projected savings, the amount went to INR 11 Lacs for a year. It was totally amazing!

Six Sigma helped a small manufacturing unit to save lacs of rupees per year! It was a huge success for the company and for me too.

I always refer this experience in all my seminars & workshops and even included in the course as a Case Study.

Case 2: Implementation of Five S

Five S is a lean tool that helps in workplace management. The five 'S' consists of five Japanese terms- Seiri, Seiton, Seiso, Seiketsu, Shitsuke. It simply means- Sort, Simplify or Set in Order, Shine, Standardize & Sustain.

It helps in converting the workplace into a more systematic & well-organized, clean & tidy and simplified workplace offering additional free space, easy availability of tools & things, hygiene, cleanliness, safety, reduced waste and positive & fresh environment to work.

This environment obviously reflects into the effectiveness of the employees, workers and other staffs and eventually benefits the company.

This case study is about the implementation of Five S in a small production company unit based in Aurangabad (Maharashtra). The company is into manufacturing of spare parts for bathroom fittings & overall plumbing requirement.

Due to increasing volume of sales order, the company was running short of the storage space though they had a sufficient space but it was over occupied by the things which were not required much. Moreover, due to congested space, the workers were not able to work to their 100% capacity which was resulting into delay in deliveries and affecting customer satisfaction.

Their owner decided to apply Five S at the right time, well before things going beyond control and the company saw the significant differences.

We used Red-Tag method for sorting & setting tools, devices, instruments, in order. We created a waste zone after any instrument is declared non-productive, which were later disposed off. We provided trainings to not only the management but also the workers being the operators and hence implementing agents for Five S.

We designed certain charts, alerts, notices and showcased in such a way that they are easily & properly visible to all who enter the company. We modified certain rules of performing different activities. We created zones & sub-zones and allocated responsibilities to the workers ensuring their active participation.

The results were outstanding! The deliverables of the project-

- 34% additional space made available
- Saved over 1200 working hours in a year
- Defect rates lowered from 9% to 2% in just 3 months
- Production increases by 17% within a year
- Revenue increases by 21% within a year

Below are some of the BEFORE and AFTER FIVE S pictures for better understanding:

Before Five S

After Five S



Training & Mentoring by e-Six Sigma

e-Six Sigma offers Six Sigma Training & Certification Programs accredited by 'Council for Six Sigma Certification (USA)'. It is one of the renowned Accreditation Providers across the world that operates in over 165 countries.

e-Six Sigma is a venture by IIM-Alumnus & Ex-Infosys Employee that won a National Award in Feb 2017 by India Education Awards.

It provides state-of-the-art Virtual Infrastructure and Curriculum to learn Six Sigma at your convenience & pace to earn Globally Trusted Certification with life-time validity and Cross-Industry Applicability.

The main reason why our learners chose 'e-Six Sigma' over others, is that, we offer Practical Exposure through our Mandatory AWYL i.e. Apply What You Learn Activities and use of Real-life Examples for easy understanding.

With an extensive knowledge & experience of almost a decade in Training & Consulting, we partner with Academic Institutes, Corporates, Government Bodies & Individuals to gratify their respective Goals by empowering the way they perform.

You can learn more about its Training & Mentoring Programs at- www.eSixSigma.in.

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