International Journal of Scientific Research in Mechanical and Materials Engineering
© 2022 IJSRMME | ISSN : 2457-0435

Utilization of Six Sigma Technique for Process Improvement in Transformation Manufacturing Industry A Review

Rajeev Ranjan Mishra[1], Dr. Lokesh Singh[2]
P.G. Scholar[1], Director[2]
RSR Rungta College of Engineering and Technology Rungta Knowledge City, Kohka - Kurud Road, Bhilai, Chhattisgarh, India

Article Info
Volume 6, Issue 3
Page Number : 01-05

Publication Issue :
May-June-2022

Article History
Accepted : 01 May 2022
Published : 20 May 2022

ABSTRACT

There has been an increasing awareness of the need to improve quality in the manufacturing sector during the previous two decades. My Research Work focuses on the improvement of quality of VPD (vapour phase drying) process in the transformer manufacturing company by the help of SIX SIGMA DMAIC APPROACH. The five stages of DMAIC are define, measure, analyze, improve and control. The goal of my research is to use the six sigma DMAIC approach to estimate and solve issues in the VPD process. Proposals for modifications that can be adopted in the organization to improve the efficiency of the manufacturing process are also offered. The focus of this case study is on the transformer manufacturing industry. Some SQC tools are used to examine the data, such as the Pareto graph, process map, FMEA, cause & effect diagram & checklists. The key faults in the VPD process detected and examined by the help of these SQC technologies. The root cause of the defect will be identified, and recommendations for improvement will be made. After the improvement stage, proposals for quality control should be made. It offers a consistent basis for resolving company problems by ensuring that processes are carried out correctly and successfully.

In this paper presenting review of literature

Keywords: VPD, PARETO GRAPH, SQC, CHECKLIST

I. INTRODUCTION

Six Sigma is supposed to be a philosophical methodology that requests the successful of utilization information to investigate business issues. Six Sigma is a strategy that gives organizations instruments to improve the capacity of their business measures. This expansion in execution and decline in measure variety assists lead with surrendering decrease and improvement in benefits, workers moral and service quality or product quality.One of easiest definition of six sigma is "It expects to improve quality by discovering defects, deciding their motivation, and improving cycles to build the repeatability and precision of interaction results. It is an approach and set of devices that assistance us

measure what we do and afterwards improve what we do." AMERICAN SOCIETY FOR QUALITY (ASQ) provides simplest definition of six sigma is to eliminate waste and to mistake proof the processes that makes an incentive for customers.They describes six sigma is a business system focused on variation reduction and imperfection disposal.Sixsigma gives a strategy to find out about measures so that sources of variation can be identified and eliminated to enable the organization to ultimately exceed customer expectations.

A large number of research papers were found during this literature review that was specifically devoted to six sigma. These research papers generally discussed the DMAIC philosophy of six sigma in detail:

II. LITERATURE REVIEW

V.PRANAVI Et al. (2021)[1]paper presents Actuality based critical thinking utilizing DMAIC approach for minimizing defects in sheet metal work of art strip off imperfection in an undertaking to move toward six sigma quality level in a main MNC vehicle producer. DMAIC identifies analyses and annihilates the underlying driver of imperfections simultaneously and in this manner assists with accomplishing prevalent degrees of value through improved efficiency. The current examination was led in the Stamping activity where the loops of sheet metals are made into the hood external panels of vehicles or cars. Deliberate application has empowered the issue on the production network quality to be settled for the issue of paint strip off at OEM. In view of this investigation, it has been accomplished that the hood panels continuing to the Rework interaction and Body shop were essentially limited. Post fruitful execution of Six sigma - DMAIC in the gathering measures, number of defectives each month plunged from 230 to 54, which is a monstrous 85% decrease in defectives. From the outcomes, it was discovered that dismissal pace of the chose OEM is brought to 0.4% from 3%. This paper empowers use of DMAIC all through the production network effectively towards accomplishing zero imperfection.

NISHANT BHASINEt al. (2021)[2] paper presents a contextual analysis wherein the Six- Sigma idea was carried out in the improvement of the interaction of activity of an restaurant to meet the client assumptions and was examined to contemplate the effect. During this examination, the issue with huge pickup request lead time according to the voice of customer (VOC) was inspected through the use of DMAIC idea of SixSigma. The examination incorporates the appropriate investigation of the current framework portraying the current issues inside the café. The strategy expects to examine the underlying driver of existing issues and afterward dependent on the main 33 driver assists with planning an improvement plan through appropriate cycle planning. Toward the finish of the examination, a couple of arrangements were proposed and were executed basically. The estimations demonstrated that the sigma level of the interaction expanded from 0 to 2.2 sigma. The expansion in the sigma level obviously portrays that the carried out arrangements decidedly affect the cycle. MUHAMMAD HAMAD SAJJAD Et al. (2021)[3]currently examine, minimization of waste as far as sack rejection at a polypropylene bag fabricating method is accomplished. The Six Sigma DMAIC approach is received which results in half waste decrease and an impressive expense saving. The sack rejection is brought to 1.20% from the past normal misuse of 2.80% utilizing DMAIC. It is discovered that this high dismissal pace of 2.80% is because of the low texture strength acquired at the weaving area, which thus happened because of the lower tape relentlessness esteems gotten from the extrusion area. Consequently, trial configuration is directed at the extrusion office and it is tracked down

that the two cooperating factors are playing a critical commitment to the process variety and subsequently bring about lower tape tenacity.

MANISH BHARGAVA Et al. (2021)[4] paper contains the Six-Sigma DMAIC approach that was utilized to diminish the cycle variety of inward and external races of ball bearing for improving product quality. This methodology diminishes the variety and set up the path for up degree in the producing organizations. Characterize period of DMAIC approach starts by trouble recognition through the voice of inner and outer clients. The later stage establish of estimating the information of bearing portions of existing cycle. The later stage constitute of measuring the data of bearing parts of existing process. where the Six-Sigma quality improvement apparatuses for example statistical process control(SPC), Control graphs, MINITAB 18.0 programming, fish bone graph alongside critical investigation of alive measure were forced to recognize root causes and limiting process variability. The improvement stage limited the assignable reasons for changeability or variability. The control stage called to keep up the improved cycle till additional improvement. This work expected that the Six-Sigma DMAIC approach was compelling for expanding the sigma level, diminishing the worth of standard deviation and furthermore diminishing the normal part per million (PPM) out of determination limits. Upsides of capability indices for 34 example were improved. A Six-Sigma DMAIC system is notable and is able to do assuming a productive part in manufacturing industry by diminishing changeability in the bearing part process.

TEUN GRAAFMANS Et al. (2020)[5]literature gives the expected advantages of utilizing measure mining procedures in Six Sigma based interaction improvement drives. PMSS is helpful as a rule to help Six Sigma-based cycle improvement exercises. It offers an organized rule for professionals by broadening the DMAICbased standard working strategy. PMSS can help expanding the productivity and adequacy of Six Sigma-based cycle improving endeavors. ALI MONTAZER MEt al. (2020)[6] study shows that the execution of Six Sigma and Lean techniques has gotten increasingly more typical in the conventional assembling area. The discoveries recorded in different works will likewise be broke down to recognize shared characteristics and to set up a menu of the most well-known apparatuses utilized and the most well-known execution markers for fast and effective Lean Six Sigma executions in customary assembling.

MARTIN MAREČEK-KOLIBISKÝ Et al.(2020)[7]In this paper commitment is pointed toward improving the process of production of specific products by applying the Six Sigma strategy. It is a functional use of this approach in a in a manufacturing unit tackling a particular issue. Six Sigma utilizes the DMAIC rationale cycle, which was additionally applied to the venture. The point of the task was to wipe out the way toward aligning parts in the wake of solidifying, which were set apart as nonconforming items. By applying the DMAIC rationale cycle, upgrades were made that abbreviated the creation interaction and time to convey creation orders to the client, less production costs, and hold a huge client.

EVA NEDELIAKOVÁ Et al. (2019)[8] This article centers around identifying weakness in rail transport processes that adversely influence common tasks. Perhaps the most genuine bottlenecks influencing railroad transport dependability is the train delay, which essentially influences the impression of rail route transport. Simultaneously, it stresses the need to apply individual apparatuses as indicated by the DMAIC cycle to accomplish constant improvement. The point of the executed Six Sigma approach in railroad endeavor is focused utilization of measurable critical 35 thinking instruments to perceive the holes in the railway transport cycle and set out singular strides for their steady evacuation.

N MOHAMAD Et al.(2019)[9] examined, the DMAIC (Define, Measure, Analyze, Improve and Control) procedure is applied at an organization delivering Flexible Printed Circuit Board (FPCB) in Malaysia. It is a drive for ceaseless improvement by the organization. The point of the examination is to decrease the quantity of open imperfections during the creation of the single sided FPCB which generously affects the net revenue of the organization. For the span of the investigation, the general imperfection rate for the specific line was decreased from 0.6% to 0.37%. The contextual investigation showed that DMAIC cycle is a compelling methodology that can address what is by all accounts a significant issues utilizing straightforward arrangements. Whenever led appropriately and proficiently, it can possibly give great re-visitations of the organization.

ZHIYI ZHUO Et al.(2019) [10] In this paper, we experimentally examine the reasons why banks influence consumer loyalty and plan the bank's Six Sigma administration measure dependent on exact examination. Six Sigma the board is client driven, based on information and realities, receiving improvement measures for the cycle, zeroing in on preventive control, underscoring borderless participation, ceaseless improvement further more, the quest for quality and productivity the executives systems. At long last/the exploration ideas for improving bank consumer loyalty is given.

MONIKA SMĘTKOWSKA Et al.(2018)[11]explained the concept that throughout the most recent twenty years there has been a developing consciousness of the need to improve quality in the modern area. This paper presents how to execute the DMAIC cycle as a component of constant improvement practically speaking. To accomplish it, the issue of value and quality improvement is broadly examined. In light of the perceived issue in the association, an examination with the use of DMAIC is finished. The recommendations of enhancements, which can be executed in the association to expand the adequacy of creation measure, are likewise introduced.

VIKASH GUPTA Et al.(2018)[12]described importance of A DMAIC methodology that can play a key role for decreasing imperfections in the tiremanufacturing method 36 in India. Using DMAIC system, the standard deviation was diminished from 2.17 to 1.69. The Cp was improved from 1.65 to 2.95 and the Cpk was improved from 0.94 to 2.66.Various types of process control charts were used for systematic observation and control the process. The subsequent step constitutes of gathering the specification data of existing tire manufacturing. This step was followed by the analysis and improvement steps, where the six-sigma quality tools such as cause–effect diagram, statistical process control and substantial analysis of existing system were implemented for root cause identification and reduction in process variation.

III. CONCLUSION

In the research gap, there are issues that aren't addressed in the study. A research gap ensures the sustainability of research by alerting the reader and many others in the field to a point in the study that demands attention. From this literature review it is observed that the status of cellulose insulation materials such as paper & pressboards determines the end of a transformer's life. It's vital to get the moisture out of the transformer insulation. The greatest technique for removing moisture from insulation nowadays is VPD, which has a shorter cycle time than other traditional methods. From the above reviews, it is observed that six sigma DMAIC methods are most effective to identify defects & to solve defects in a process. Use of Six Sigma DMAIC method in transformer manufacturing industry for increasing efficiency of the overall production system

is not observed in previous literature reviews especially in a Vapour Phase Drying Process for moisture removal from transformer coil insulation. VPD process is one of the most important methods for enhancing the life span of the transformer or reducing the chances of failure of transformer. The research gap identified in the literature review will be taken into account in our investigation.

IV. REFERENCES

[1]. V. Pranavi, V.Umashankar, Application Of Six Sigma Approach On Hood Outer Panel To Reduce The Defect In Painting Peel Off, MATERIALS Proceedings (2021) pp1269-1276.

[2]. Nishant Bhasin, Harkrit Chhatwal, Implementation Of Six-Sigma Tools In Hospitality Industry: A Case Study,Springer,Advances In Manufacturing And Industrial Engineering(2021) pp 1171-1182.

[3]. Muhammad Hamad Sajjad,Khawar Naeem,Muhammad Zubair, Waste Reduction Of Polypropylene Bag Manufacturing Process Using Six Sigma DMAIC Approach: A Case Study, Cogent Engineering (2021) pp 1-21.

[4]. Manish Bhargava, Sanjay Gaur, Process Improvement Using Six-Sigma inbearing Manufacturing Industry: A Case Study, IOP Conf. Series: Materials Science and Engineering (2021) pp 1-15.

[5]. Teun Graafmans, Oktay Turetken, Hans Poppelaars, Dirk Fahland, Process Mining For Six Sigma , Springer (2020) pp 277-300.

[6]. Ali Montazer ,M, Craig D And Kyle Aa , Review Of Process Improvement Initiatives And Implementation Of Lean Six Sigma In Forging And Casting Operations, Crimson Publishers, (2020)AES.000509. 1(2).

[7]. Martin Mareček-Kolibiský, Marta Kučerová,Improving Products Quality Applying Six Sigma, Sciendo, Number 46(2020) pp 57-64.

[8]. Eva Nedeliaková, Vladimíra Štefancová, Michal Petr Hranický, Implementation Of Six Sigma Methodology Using DMAIC To Achieve Processes Improvement In Railway Transport , Production Engineering Archives 23 , (2019)pp18-21.

[9]. N Mohamad, S Ahmad, H A Samat, C K Seng And F M Lazi, The Application Of DMAIC To Improve Production, IOP Conf. Series: Materials Science And Engineering,012041 (2019)530. 82

[10]. Zhiyi Zhuo, Research on Using Six Sigma Management to Improve Bank Customer Satisfaction, International Journal Of Quality Innovation (2019)5:3,1-14.

[11]. Monika Smętkowska, Beata Mrugalska, Using Six Sigma DMAIC to Improve the Quality of the Production Process: A Case Study,ELSEVIER 238, (2018), pp590 – 596.

[12]. Vikash Gupta, Rahul Jain, M. L. Meena, G. S. Dangayach, Six-Sigma Application In Tire-Manufacturing Company: A Case Study, Springer 14, (2018), pp511–520.

Cite this article as :

Rajeev Ranjan Mishra, Dr. Lokesh Singh, "Utilization of Six Sigma Technique for Process Improvement in Transformation Manufacturing Industry A Review",International Journal of Scientific Research in Mechanical and Materials Engineering (IJSRMME), ISSN : 2457-0435, Volume 6 Issue 3, pp. 01-05, May-June 2022.

URL : https://ijsrmme.com/IJSRMME22631