

Lean Manufacturing Implementation Techniques Frameworks

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Abstract: This paper presents the case study to find the design optimization for special purpose MIG welding operation. The MIG Welding parameters are the most important factors affecting the quality, productivity and cost of welding. This paper presents the effect of welding parameters like welding current, welding voltage, welding speed, gas flow rate, rotational speed of work piece, filler wire feed rate on MIG welding. Experiments are conducted based on Taguchi Technique to achieve the required data. An Orthogonal Array, Signal to Noise (S/N) ratio and analysis of variance (ANOVA) are used to find out the welding characteristics and optimization parameters. Finally the confirmations tests have been carried out to compare the predicted values with the experimental values.

Keywords: MIG welding, optimization, Design of Experiments (DOE), Analysis of Variance (ANOVA), Signal to Noise (S/N) ratio

1. INTRODUCTION

The Lean Manufacturing Systems (LMS) has attracted serious attention among the practitioners and researchers in the recent years. The principles and practices of Lean Manufacturing (LM) were not only implemented in the manufacturing organizations, but also in service organizations. Although numerous articles dealing with the theory and practice of LM have been published, ironically, not many organizations have been successful in implementing the LMS and demonstrate a significant improvement in performance similar to that of Toyota Motor Corporation (TMC). Many researchers have pointed out that one of the reasons for the same is that there is an improper understanding among the practitioners regarding LMS. However, implementing a change management programmes like LMS requires a thorough understanding about the 'constituents of LMS', 'performance measures of LMS', 'implementation procedure of LMS' and 'assessment of LMS'. In addition, it is also necessary to analyse 'whether implementation of LMS is justified'. However, it is believed that such fundamental issues are not yet addressed completely in the literature of LM. Hence, there is a need to study the design and assessment of LMS. In this research, a detailed literature review is carried out to understand the current status of LM and to identify the research gaps. To resolve some of the research gaps, comparative analysis of various LM frameworks and frequency analysis of the LM elements is performed based on which a conceptual framework for LMS and an implementation framework for LMS is proposed. The proposed frameworks are validated using a case study. Similarly, a frequency analysis is carried out for to identify the performance measures of LM based on which a new Performance Measurement System (PMS) framework for LMS was proposed by modifying the balanced score card approach. The proposed PMS framework for LMS is validated by comparing the identified performance measures with the performance measures identified from the existing case studies that are available in the literature. Subsequently, various multi-attribute decision-making models such as analytic network process, preference ranking organisation method for enrichment evaluations and performance value

analysis are developed for the justification of LMS for a case organization, while simulation models are developed for the design of LMS for various case organizations such as a shop floor that manufactures brake linings using a batch production system, a cell that produces spiral and crown wheels (gears) using a mass production system and a factory that fabricates doors and windows using a job shop production system. Later, the graph theoretic model is developed for the assessment of the roles and responsibilities of human resources during the implementation of LMS, while a benchmarking process is developed for the assessment of LMS in a case organization. Thus, it is believed that these contributions would enable better understanding of LMS by the practitioners and also pave way for many Indian industries to design and assess the principles and practices of LMS and achieve significant competitive advantage over other industries from abroad.

2. NEED FOR THE RESEARCH

Thus from a quick look at described in advance, it could be determined that, LM has been the 'communicate of the world' inside the ultimate many years and numerous works were stated on LM in extremely good nations at some stage in the globe. The term LP and LM are greater well-known than the rest of the search phrases together with JIT production JIT production, TPS, and so on. As glaring from the number of net pages. Apart from this net are seeking, there are extra than 100 journals (every country wide and international), which evaluations approximately diverse studies in LM. Around 2000 books on LM and associated factors are published. A cursory searching for on the internet site www.Amazon.Com (as on 30 August 2008) famous shows that approximately 1900 titles associated with LM and approximately 2,seven-hundred titles related to LP are published and available in the marketplace.

3. OBJECTIVES OF THE RESEARCH

The intention of the studies is to have a have a look at the layout and evaluation of lean manufacturing structures. The aim may be finished through wearing out the subsequent:

- a. Detailed literature evaluation to apprehend the modern popularity of LM and grow to be aware about the research gaps
- b. Comparative assessment of numerous LM frameworks and frequency assessment of the LM factors to make bigger a conceptual framework for LMS and an implementation framework for LMS.
- c. Frequency analysis for the layout of overall performance measures of LM to advocate a cutting-edge Performance Measurement System (PMS) framework for LMS based totally absolutely on the Balanced Score Card (BSC) technique.
- d. Development of the Multi-Attribute Decision-Making (MADM) models such as Analytic Network Process (ANP), Preference Ranking Organization Method for Enrichment Evaluations (PROMETHEE) and Performance Value Analysis (PVA) for the justification of LMS for the case business agency
- e. Development of the simulation fashions for the layout of LMS for various case agencies collectively with a shop ground that manufactures brake linings using a batch production device, a cellular that produces spiral and crown wheels (gears) using a mass production tool and a factory that fabricates doors and home domestic windows using a manner store production device
- f. Development of a Graph Theoretic (GT) model for the evaluation of the roles and responsibilities of Human Resources (HR) in some unspecified time in the future of the implementation of LMS.
- h. Development of benchmarking technique for the assessment of LMS in a case agency.

4. DEVELOPMENT OF A PERFORMANCE MEASUREMENT SYSTEM FOR LEAN MANUFACTURING SYSTEMS

The literature concerning the sector of PMS and metrics could be very big and a variety of review papers are already to be had.

Elaborate reviews have been executed in current years, to name some. Hence, on this evaluate, simplest a brief theoretical history about PM is presented. investigated the achievement and failure of PMS design interventions by way of studying round ten businesses and concluded that there are two foremost perceived drivers for the implementation of the PMS (out of a list of 5, which includes the advantages of overall performance dimension, endured pinnacle control assist, time and effort required, result of the sports of the internal or external facilitator and juxtaposition of the PM intervention with other initiatives) and 4 perceived elements that block implementation (which encompass problems with data get right of entry to and statistics generation systems, time and effort required, problems concerned with growing suitable measures and the private effects of PM). asserted that organisations need to have systematic processes in vicinity to manipulate the evolution of their PMS to make certain that they keep to replicate the employer's context. emphasized that in order for an employer to make powerful use of the effects of overall performance measurement, it ought to be able to make the transition from size to control. Bourne et al. (2000) referred to that the latest instructional literature and practitioner sports are more targeted best at the early degrees of the improvement of the PMS – i.e., development of the conceptual frameworks and processes for designing the overall performance measures. Hence, they addressed the ones problems that rise up when designing, imposing, the use of and continuously updating PMS in production agencies. They cited that the development of PMS can be divided into following 3 major phases:

1. Design of the overall performance measures
2. Implementation of the performance measures
3. Use and update of the performance measures

These three essential stages and the associated steps proposed by way of Bourne et al. (2000) might be used to layout and broaden the conceptual PMS for LMS. To supplement the theoretical aspects, essential literature assist can be used to bolster the arguments evolved all through these three stages aside from supplying the answer to the first research query – ‘what is the modern fame of PMS and performance measures

It is believed that the taxonomies mentioned above might have supplied a clean knowledge approximately the LM factors and its courting in the company. The subsequent assignment is to provide a shape/framework, which unifies all these elements and practices of LM into a coherent entire. The motive of this framework is to remedy a number of the limitations of the frameworks that are grouped below the ‘design/conceptual framework’ category. It is found that the wide variety of factors beneath each framework of this category is varying. Hence, they do no longer specify surely what represent LM. Similarly, there may be no consistency in highlighting the LM factors the various existing frameworks. For instance, the framework proposed with the aid of fluctuate substantially in the listing of LM factors, even though they have a similar shape of a residence. Hence, based totally at the comprehensive listing of LM elements recognized in the in advance section, a framework in the ‘design/conceptual framework’ class has to be proposed to assist the practitioners to recognize really ‘what constitute LM’. A cursory evaluation of the frameworks diagnosed above found out that the residence structure is predominantly utilized in building the frameworks. Hence, the equal has been adapted and stepped forward to represent our proposed comprehensive framework.

Foundation: It refers to a widespread pre-needful which must be found in any organization. These pre-standards must now not be considered as LM practices as they're not unusual for any alternate management programmes along with TQM, TPM, and many others. Also, those pre-requirements can't be taught or compelled on the human assets of the company, just like sure LM elements including successive test, self-test, etc. However, they must be advanced and nurtured. Good leadership, commitment, culture and human aspects form the foundation.

5. CONCLUSION

Thus, in this financial ruin, numerous research papers regarding LM, which can be posted in renowned national/worldwide journals and meetings, have been reviewed. It modified into decided that the studies in LM are progressing in many tips. However, a review paper in English remains no longer to be had inside the literature of LM to tune the milestones in the evolution of LM. Hence, an strive has been made to convey out a complete assessment of papers related to LM or LP. As a number one step, a category scheme changed into proposed for the literature of LM to provide a better knowledge. Similarly, a whole lot of case studies and survey papers exist in the literature of LM. A compare of papers associated to the software program of analytical gear in LM discovered that simulation has were given sizable interest the diverse researchers. Finally, the research gaps had been identified underneath each category and the studies gaps, a very good manner to be considered for this thesis is defined in brief. an strive may be made in the coming close to chapters to remedy these studies gaps.

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