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The Techniques of Lean and Green Manufacturing Systems

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Abstract

In today's compititive world, almost every manufacturing companies is in the race of earning money on the cost of polluting and damaging environment. Lean manufacturing has been used to improve processes, to reduce process waste, to obtain maximum output and to earn profit. Manufacturing companies are concerned with converting materials and labor into goods and services as efficiently as possible to maximize the profit of an organization. It is in order to create optimized versions that make the best use of resources without affecting the services delivered or product created. Green manufacturing is a method of manufacturing that minimizes waste and pollution. Lean manufacturing is the system which aims in elimination of the waste from the system with a systematic and continuous approach. In this research paper the techniques of lean manufacturing system and green manufacturing system has been studied.

Keywords: Lean Manufacturing, Green Manufacturing, Green Manufacturing, Waste.

INTRODUCTION

Green manufacturing is the new manufacturing system that involves various practices and green strategies and techniques to make the system more eco friendly and eco efficient by the use of Lean Manufacturing system. These strategies include creating products/systems that consumes less material and energy, substituting input materials (e.g. non-toxic for toxic, renewable for non-renewable), reducing unwanted outputs and converting outputs to inputs (recycling).

Higher global awareness of environmental risks gives rise to the new green movement or green technology. In addition, the evolving green technology together with more eco-friendly products is helping in realizing the green manufacturing objectives in real practice. Although interest in green manufacturing is increasing more and more within the research and industrial communities. This paper presents techniques for new lean green manufacturing system.

However, the rate at which Green manufacturing systems are being implemented is not keeping pace with the rapid global expanse of the manufacturing industry, and thus over time we are becoming less "sustainable". Lean manufacturing is rapidly spreading around the world as the premier alternative to the outdated mass production model, for producing quality product, at the lowest cost and shortest time. If Green manufacturing can be integrated with Lean manufacturing, such that Lean serves as a catalyst to Green manufacturing implementation, economically and environmentally sustainable manufacturing could be realized [7]

DESCRIPTION

Lean Manufacturing

The aim of lean manufacturing is to eliminate waste from the systems and operations and extracting maximum outputs in minimum inputs. Waste is anything other than the minimum amount of equipment, materials, parts, and working time, which absolutely are vital to production. Waste can take many forms and can be found at any time and in any place. It may be found hidden in policies, procedures, processes and product designs, and in operations. Waste consumes resources but does not add any value to the product value [5]

Green Manufacturing

Green Manufacturing is a method of manufacturing that minimizes waste and pollution. Green Manufacturing goals is to utilize minimum natural resources and conserve them for future generations. The benefit of Green Manufacturing is to saves useless cost, and promotes research and redesign. Thus, green manufacturing refers to how goods and services are produced with limited effects on the environment under present technological and economic challenges.

TECHNIQUES OF LEAN MANUFACTURING

The various techniques of lean manufacturing are:-

1 Kan-ban System or pull-systems

A Kan-ban is a card containing all the information required to be done on a product at each stage along its path to completion and which parts are needed at subsequent processes. This concept focuses on reducing excess inventories of raw or work-

inprocess materials which cannot be consumed immediately by the production cycle [1]

2 SMED or single minute exchange of dies

It is a practice that helps the organization to reduce changeover durations in order to adjust the manufacturing process based on product demand. It has the potential to reduce the amount of waste generated from raw and unprocessed materials left over in the manufacturing processes [2]

3 5S

It means Sort (remove that which is not needed), Set In Order (organize remaining things), Shine (clean and inspect working place), Standardize (write standards for above), Sustain (regularly implement the standards).

TECHNIQUES OF GREEN MANUFACTURING

The various techniques of green manufacturing are:-

1. Changes in production processes:- Many major production process changes fall in to the following categories.

(1) Changing dependence on human intervention.

(2) Use of a continuous instead od batch process.

(3) Changing the nature of the steps in the production process.

(4) Eliminating steps in production process,and

(5) changing cleaning process.

2. Changes of inputs in the production process:- Changes in the inputs is an important tool in green manufacturing. Both major and minor product ingradients and inputs which contribute to production, without being incorporated in the end product, mayb be worth changing. An example where changing a minor input in production may substantially reduce its environment impact is the use of paints in the production of cars and airplanes. The introduction of powder based and high solids paints substantially reduces the emission of volatile organic compounds [3]

3. Internal re-use:- The potential for Internal re-use is often substantial, with many possibilities for the re-use of water,energy, and some chemicals and metals. Washing, heating and cooling in the counter current process will facilitate the Internal re-use of energy and water. Closed loop process water recycling which replaces single pass

systems is usually economically attractive, with both water and chemicals potentially being recycled [6]

4. Better housekeeping:- Good housekeeping refers to genally simple, routinized, non- resource intensive measures that keep a facility in good working and environmental order. It include segregating wastes, minimizing chemical and waste inventories, installing overflows alarms and automatic shutoff valves, eliminating leaks and drips and putting collective devices at places where spills may occur, frequent inspections aimed at identifying environmental concerns and potential malfunctioning of the production process, better control on operating conditions (flow rate, temp., pressure, etc.), regular fine tuning of machinery, and optimizing maintainence schedules[2]

CONCLUSION

This paper aims to study techniques of lean manufacturing and green manufacturing. Lean and green manufacturing concept is one of the best recent practices in today's time. In manufacturing systems focus is laid on waste reduction, so modern management programs like Lean Manufacturing represent today's best practices in manufacturing systems. Althoughta reducing environmental pollution is not the ultimate goal or main focus of lean manufacturing. So, these achievement may not be maximized in the normal system of lean manufacturing .

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