



Research Article

GREEN MANUFACTURING - RECENT DEVELOPMENT IN THE MANUFACTURING SCENARIO

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ABSTRACT

The paper intends to give the survey of green manufacturing, describe what green manufacturing is, its need and methods of manufacturing green which reduces waste and pollution. This paper focuses on the green design for our environment by the green manufacturing system, energy conservation, development of a product with minimum wastage. The paper also highlights the pros and cons of green manufacturing to form a sustainable and reusable product. The main objective of green manufacturing is to save the environment and to reduce the cost of the product.

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INTRODUCTION

With the increase in global warming, green is becoming an important strategy in the manufacturing sector; sustainability in green manufacturing is a competitive need. Green manufacturers would play a vital role in the economic development worldwide in the years to come. Though the recent global recession has forced some technological companies to resort to lay-offs it is observed that 'clean' technology industries have been building new production and manufacturing facilities at a rapid space. With the rapid hike in petroleum prices, increased concern for the environment and global warming, sectors like solar power, wind power, electric or fuel cell vehicles and bio-fuels are considered to be the next generation growth areas in manufacturing industries.

The term "green" manufacturing can be looked at in two ways: the manufacturing of "green" products, particularly those used in renewable energy systems and clean technology equipment of all kinds, and the "greening" of manufacturing-reducing pollution and waste by minimizing natural resource use, recycling and reusing what was considered waste, and reducing emissions.

This paper is based on the second definition. There's a lot of buzz, hype and real progress being made when it comes to the second definition of green manufacturing as well.

Green Manufacturing is a method for manufacturing that minimizes waste and pollution achieved through product and

process design. It slows the depletion of natural resources as well as lowering the extensive amount of trash that enter landfills. Its emphasis is on the reducing parts, rationalizing materials, and reusing components, to help make products more efficient to build. Green Manufacturing is a philosophy rather than an adopted process because it motivates ongoing improvement efforts even though it may be impossible to achieve. It is a holistic endeavor intended to result in less waste, cleaner products and processes, a better and safer working environment, improved relationships between companies and local communities, compliance with government regulations and enhancement of profitability and competitiveness. The reason it is such an important tool is because it intertwines with today's manufacturing strategies of global sourcing, concurrent engineering and total quality.

Corporate and business leaders at the forefront of redesigning, restructuring, re-engineering and retooling operations and processes are working towards being more environmentally and socially sustainable and are finding that doing so produces measurable results that others can and would like to emulate, even leading to new business lines and a notable recognition for their efforts.

New ways of thinking about manufacturing, both broadly and narrowly, is having a huge impact on manufacturers worldwide. Such efforts are intimately entwined with a movement towards taking on, or accepting, greater corporate social responsibility (CSR). One such driving force has been the development of systems analysis, which has evolved into the growing field of industrial ecology.

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the growth of industry in

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India, partnering industry and government alike through advisory and consultative processes. CII is a non-Government, non-profit, industry led and industry managed organization, playing a proactive role in India's development process. CII catalyses change by working closely with Government on policy issues, enhancing efficiency, competitiveness and expanding business opportunities for industry through a range of specialized services and global linkages. It also provides a platform for the sector's consensus building and networking. Major emphasis is laid on projecting a positive image of business, assisting industry to identify and execute corporate citizenship programmes.

Need

Going green helps the environment by reducing the amount of pollution that enters the soil, water and air. By using alternative energy sources and avoiding the burning of fossil fuels, recycling and reducing waste and driving more efficiently, fewer pollutants are released into the environment. Not only does green manufacturing benefit the environment, but growing numbers of businesses are finding that reducing resource use, waste and pollution, along with recycling and reusing what was formerly looked at as waste, yields benefits not only in terms of an improved bottom line, but in terms of employee motivation, morale, and public relations.

Process of Green Manufacturing

- Lead-free Soldering for electronics
- Reduce Emission of Pollutants
- Use of environment-friendly chemicals
- Use the lead-free solders to manufacture the products and by not allowing adding any Pb intentionally in products, then the products can be defined as lead-free products.
- Packing Materials – Disposal and Environment friendly
- No release of toxic substances in product life
- End of life treatment – Recycling of components, collection of equipment.
- Use of Biodegradable materials

Examples of Manufacturers Who Are Going Green

Manufacturers stand to gain from finding ways to make their operations greener. According to a post on the Manufacturing Trends and News blog, green manufacturing is all about sustainability. The key to sustainability is to ensure that what you do today won't come back to haunt you later with detrimental effects to health, the environment or finances. While humanity benefited greatly from the Industrial Revolution, there were also long-term negative consequences, including pollution and resource depletion. Today, businesses, consumers and government leaders understand that they must evaluate their actions to determine whether they're sustainable. With a history of past excesses as the backdrop, a Green Revolution is underway in the manufacturing industry. Many new technologies fall into the green manufacturing category, including lean systems to reduce waste, renewable energy sources and product lifecycle management systems. An article from Fast Company magazine highlights additional ways of companies that are making their operations greener. Here's a look at three of the examples cited.

- General Mills recycles solid waste: General Mills used to pay to have its solid waste taken to a landfill, but the company discovered other uses of the byproducts. For example, it took oat hulls, a byproduct of Cheerios, and burned it as fuel. Customers are now lining up to buy the material, and in 2006, the cereal maker recycled 86 percent of its solid waste.
- Wal-Mart invests in hybrid trucks: The world's largest retailer is betting on hybrid technology to power its truck fleet, which is the second largest in the U.S. It's paying for ArvinMeritor, Eaton, International and Peterbilt to create the first heavy-duty diesel-hybrid 18-wheeler.
- Coors turns waste beer into ethanol: Through a partnership with Merrick & Company, an engineering firm in Colorado, Coors takes waste beer and produces 3 million gallons of ethanol a year. The 200-proof product is then sold to Valero Energy and distributed in gas stations in Colorado.
- Businesses shouldn't see pressure to make their operations greener as a burden. Rather, sustainability is an opportunity, and striving for it will help ensure a long-term success.
- Maruti Suzuki India Limited (MSIL): Maruti Suzuki, the leader of the automobile industry in India, also boasts of the largest manufacturing facilities in the country. Although both the manufacturing facilities work at full capacity, the company ensures that this does not harm or damage the environment.

Over the years, MSIL has taken special initiatives to minimize the carbon footprints of its manufacturing facilities, products, and supply chain operations. The company believes that investing in environment friendly technologies makes business sense as it shall bring good results in the medium to long term. Keeping in line with this vision, MSIL has always remained ahead of the environment regulations and improved its products, manufacturing and supply chain operations to minimize environmental impact of its business operations on society.

The country's industrial ecosystem is relatively young, but given the promise of rapid growth, the company has chosen a sensitive path. The company is going ahead with investments in environment friendly technologies and waste minimization to make its operations greener and environment friendly going forward. Although the initial investment is high, the company has realized that in the long term, it gives a better return of the investments made. The company is investing and implementing such initiatives/processes in both their manufacturing facilities in various verticals. Maruti Suzuki has the distinction of being the first automobile company in India to register a Clean Development Mechanism (CDM) project with the United Nations Framework Convention on Climate Change (UNFCCC).

Since manufacturing is the core aspect of the company, the company has maintained a special focus on this. MSIL follows the SMC's basic philosophy of smaller, lighter, shorter and neater facilities. The company has identified five focus areas for protection of the environment and optimum utilization of resources. The initiatives undertaken can broadly be classified under the following verticals:

- Material use and weight reduction
- Energy conservation
- Water conservation
- Air emissions reduction
- Waste management

Pros and Cons

When a business makes the decision to become a green, or environmentally friendly, manufacturer, it consciously decides to promote certain values. These values center on the goal of protecting the environment but can also focus on things such as technological innovation and progress.

Pros

Green manufacturing can directly benefit the environment. For example, green manufacturing can help to reduce waste and harmful emissions and work toward preserving resources that are finite and nonrenewable. Many customers want to support businesses that implement green manufacturing, so by implementing this process, a business can also gain new customers.

Because of the public's consensus about the need to protect the environment, a company can directly improve its public relations by implementing green manufacturing. Additionally, this process can lower costs for the business over the long term through the implementation of more efficient systems and fostering a company culture dedicated to innovation in processes. Further, these more efficient processes can result in lowering the amount of waste a business produces.

Cons

One of the disadvantages of green manufacturing a business can experience relates to the transition to green manufacturing. Businesses will need to locate funding sources to finance the switch to green manufacturing. Although the process should ultimately save the business money, in the short term implementing green manufacturing can cost business significant amounts of money. Further, the transition generally requires not only the implementation of new manufacturing processes, but also the ability to design and build the necessary technology and machinery to support green manufacturing. Additionally, a business will typically have to find new talent to come in and educate current employees on how to work in the new green manufacturing environment.

Another potential disadvantage to going green relates to international trade. Many businesses hesitate to implement a green manufacturing system because they fear that this process will become an impediment to the free flow of goods and profitable trade deals. This hesitation can apply to a wide range of manufactured products and industries. For example, a business might hesitate to implement green manufacturing because it fears losing an international supplier that does not participate in green manufacturing.

CONCLUSION

A dilemma for manufacturing companies adopting green practices is that these are unlikely to generate profits in the short term. But a trade-off for long-term gains is both necessary and sustainable if the organization's vision is set firmly on the triple bottom line-people, planet, and profits.

Now it is time to keep our profit oriented company aside to make a green and profit oriented company. In green manufacturing process we should not forget one thing that every area in the foundry operation is a fertile ground for green savings. To make a foundry green the following are some of the processes:

- Energy savings
- Core systems
- Pollution control

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