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Topic – advanced green manufacturing

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Abstract

Advanced 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 amounts of trash that enter landfills. Its emphasis is on reducing parts, rationalizing materials, and reusing components, to help make products more efficient to build.

Advanced 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 Government of India would like the manufacturing sector to play a bigger role in the country's economy. The Ministry of Commerce and Industry, in its discussion paper on the growth strategy for manufacturing, has set a target to increase the sector's contribution to the GDP to 25 percent, from the current level of about 16 percent. While this growth is necessary, the country's environmental concerns need to be mitigated — the manufacturing sector must use energy and resources efficiently, and minimize generation of waste. It is estimated that even if every factory, power plant, car and aeroplane is shut down, the average global temperature would still increase by 0.6˚C in this century. 'Advanced green manufacturing' or sustainable industrial activity is now the need of the hour and no more an empty slogan.

Introduction

Advanced green manufacturing involves transformation of industrial operations in three ways: (1) using Green energy, (2) developing and selling Green products and (3) employing Green processes in business operations. A recent global survey by BCG reveals that as many as 92 percent of the companies surveyed are engaged in Green initiatives. Manufacturing companies that adopt Green practices benefit not only through long–term cost savings, but equally importantly, from brand enhancement with customers, better regulatory traction, greater ability to attract talent and higher investor interest. However, these benefits require a long term commitment and making tradeoffs against short term objectives, as the economics of Advanced green manufacturing is still evolving and not well understood as yet. The motivation for adopting Green has varied across sectors. Some take it up owing to regulatory compulsions (example: power), while others see it as an opportunity to build a stronger brand with consumers (example: retail). Steel manufacturers have adopted Green initiatives to stabilise rising energy costs, while automobile companies have seen it as an opportunity to launch electric and hybrid cars to meet increasingly stringent emission regulations. The impact of Green initiatives also varies by the industry sector. For example, Green initiatives in the power sector have the maximum impact on reducing CO2 emissions followed by transportation and then the industrial sector. Consumers are increasingly adopting Green products and habits. In a recent BCG survey of consumers in both, developed and developing countries, more than half the respondents indicated their preference for Green products, especially in food and consumer durables. Many consumers also indicated their growing willingness to pay a premium for Green. However, the survey also revealed that there is still a huge gap in consumer awareness that Green companies must strive to bridge. Successful implementation of Advanced green manufacturing requires going beyond small standalone initiatives, and adopting an integrated three–step framework: (a) planning for Green as a core part of business strategy, (b) executing Green initiatives across the value chain by shifting towards Green energy, Green products and Green processes and (c) communicating and promoting Green initiatives and their benefits to all stakeholders. Advanced green manufacturing in India is at the take–off stage. While there has been significant policy development and adoption by the manufacturing industry in the area of Green energy, there is

substantial scope on both the policy front and its adoption in the areas of Green products and Green processes. Successful transformation into Advanced green manufacturing will bring tremendous benefits, both tangible and intangible, for the nation and the business community.

Objective

- The purpose is to support future generations by attaining sustainability by the means of preserving natural resources and getting maximum productivity from manufacturing.

Benefits of advanced advanced green manufacturing

1. Creates a great reputation to the public.
2. Saves useless cost.
3. Promotes Research and Design.

Implementation

Production Process Production process here involves the product design and process design. Both plays vital role in implementing Advanced green manufacturing. Manufacturers have to develop greener product design. This means that manufacturers have to consider the life cycle of the product and also the virgin

material used. To reduce waste, biodegradable and recyclable materials should be used. Materials must also be non-toxic. Besides that, product must be designed for disassembly and remanufacturing. This means modular product design and snap fit or push fit instead of glue and screws. In the process design, manufacturers have to move from the traditional end-of-pipe control to new technologies such as pollution prevention, production process modernization and materials substitution. Process optimization should be implemented to minimize losses and wastes in energy and materials throughout the production process [5]. Virgin materials can be recycled through the process of Chan 5 distillation and filtering. The distilled or filtered materials could be reintroduced in the life cycle wherever new materials aren't required. Waste will be reduced on the spot. Manufacturers must also improve the end-of-life management of the products. Some of the choices are repair, refurbishment and reuse; remanufacturing; recycle with disassembly; recycle without disassembly; and disposal to landfill. As stated by Richard Florida in California Management [6], companies should invest in production process improvements rather than control technology. "Corporate companies spent $7.2 billion in pollution abatement and control expenditure of which $3.2 billion were on production process enhancement." Besides that, according to Robin Bergstorm [7], companies should quit 'leapfrogging from lily to lily pad.' It means that they should not jump on every chemical that initially describes itself as more environmentally safe but later on it creates even more problems than the original material. They should conduct more research to validate its effectiveness in protecting the environment before deciding on its usage.

Process of advanced Green Manufacturing

- Companies move from traditional end-of-pipe control to new technologies.
- End-Of-Life Management
- Waste source reduction on the spot.
- Recycling
- Virgin Materials are recycled
- Advanced manufacturing systems promotes green design and production strategies.
- Development of innovative manufacturing systems.

<u>Different Aspects</u>

- JIT Manufacturing
- Zero Emission Strategy
- ISO 9000 and ISO 14000

Obstacles

- Businesses have a responsibility of influence
- Prices of raw material and subsidized energy are essential
- Lack of availability and information

Strategic Challenges

- Range of coordinated actions
- Trade and environment policies (mutually supportive)
- Eliminating environmental harmful subsidies
- Promoting the transfer of technologies and financial resources
- Efficient operation of markets
- Achieving greater international cooperation

Example of advanced Green Manufacturing

- Murray Ohio Manufacturing Company
- produces lawn mowers and bicycles
- Wanted to develop ways of reducing scrap metal.

Advanced green manufacturing concepts from different sources

“Manufacturing giants General Electric, DuPont and Toyota have been at the forefront of selling green. In doing so, many of these companies also work with the government to help develop policy. For instance, earlier in the year a group of manufacturers and big business, which includes GE and DuPont, formed an organization that calls for a cap on carbon dioxide emissions.”

“Last December, Nissan Motor Co. Ltd. rolled out its green marketing campaign, Nissan Green Program 2010. Primary program goals include CO2 reductions to meet upcoming U.S. and European emissions standards and the development of various alternative-power technologies. The company is exploring several types of technologies because cost isn't the only challenge regulations present. Manufacturers also must gain customer acceptance, according to Larry Dominique, vice president of product planning for Nissan North America.”

“ As CARB (California Air Resources Board) began discussing their ideas of enacting more stringent emission limits for manufacturers in 2010, Toyota quickly reacted by first studying whether or not meeting these levels was technologically feasible, then evaluated the cost/value impact of meeting such levels three years early," Boyd says. "As an organization fully committed to environmentally friendly products and processes, the decision to certifiably meet California's 2010 emission levels did not meet much resistance within Toyota's executive-level management.”

While recent pressure to become green may have increased the desire of companies to waste less, they also want to decrease waste to ensure greater profit margins. If something is sold at the same price but less material, labor and effort is needed to produce it, then this is seen as a gain for the company. While waste minimization for a company often requires an investment of capital and time, it is almost always paid for with increased efficiency and more goodwill towards the company as well.

Different processes used to reduce waste:

Resource Optimization: using raw materials more effectively

> This method is very useful for many manufacturing companies to take advantage of.
> For example: The reuse of scrap metal is very useful because most metal properties allow it to be melted and used for the same purpose.

Improving quality control measures

> Investing more time in process monitoring, such as, making sure the product is made complete and green throughout the whole process

The design of the process and the product that will be used to produce the selling product is the most important part of manufacturing. Focusing on the management of the process and products being used will take up much time and capitol, but the return on investment should forecast to a much higher return.

Improving quality of the product

<u>Benefits of Waste Elimination In Manufacturing</u>

“A company that waste is a company that could be doing much better”

Many companies need to focus more on streamlining there process rather than trying to make a quick dollar. Streamlining is a process through which a company eliminates waste through its production process. A streamlined business is also able to more accurately deliver its products. It avoids the common and serious problem of over production that plagues so many businesses. Also maintaining a streamlining appearance represents your company as on the "up and up"
Imagine a small amount of waste continuing over several years and you can see just how much money and time can be lost.

Summary

1. Advanced green manufacturing is the elimination of waste through the production process.
2. Companies must step up and take responsibility for their actions.
3. End-of-life management used more often then end-of-pipe control.
4. Advanced green manufacturing promotes innovative design.
5. Processes such as JIT and zero emission should be exercised by all companies.
6. Advanced green manufacturing saves cost but more importantly it saves valuable resources.