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A STUDY ON MANUFACTURING DESIGN USING 3R AND INTRODUCTION TO 6R

A. Mr. V. V. Thakar, *H. O. D., S. S. I. E. T. Ghogaon*,
B. Mr. Sushant N. Pawar, *Student, JSPM, Pune,*
C. Mr. Digvijay .M. Mane, *Student, AGTI'S DACOE, Karad.*

Abstract **-This paper discuss about the manufacturing design using 3R. At the alarming growth rate of the words consumptions the linear economy model of creating products using this products and ten disposing of them , with no consideration of the environmental societal and economic impacts , is flawed manufacturing approach that is unsustainable therefore envisioning a future where every waste becomes an asset and no value goes recovered.A future was all products at the end of the primary use are recovered and reused, remanufactured or recycled for multiple generations, has become more than a reality, but a necessity.**

This 3R helps to decrease the amount of waste, we thrown away. They conserve natural resources, landfill space and energy. This concept is essential for achieving economic growth, environmental protection and social benefits it also present in case study with application that shows the lifecycle cost benefits. This is an outlook for future research than present.

Keywords-3R, Manufacturing Process, Sustainable Manufacturing, Reduce, Reuse, Recycle, Recover, Redesign, Remanufacture.

I. INTRODUCTION

MANUFACTURING DESIGN –

Manufacturing design is the general engineering art of designing products in such a way that they are easy to manufacture. The important part of designing is manufacturing cost of a product with production decision.

DFM defines the process of designing or engineering a product in order to simplify the manufacturing process in order to decrease its manufacturing costs.

- Sustainable manufacturing–

Sustainable manufacturing is the conception of manufactured products through economical sound processes that reduce negative environmental impacts while saving energy and natural resources.

Manufacturing process are the steps through which raw materials are transformed into a final product like Metal.

Metal is a source which is used in day to day life so the production of metal is necessary. For next generation gradually the percentage of metal or environmental source will become reduced. To avoid this best way means 3Rconcept.

Environment – environment is the surrounding of our life. In our environment the effects on human and animal life: Increase in toxicity causes health and may affect as cancer. Decrease in strength of nutrients which indirectly from soil. Breathing problemsoccurs because of burning and inhaling smoke of waste materials. Solids undisclosed in water creating unhygienic conditions. So in order to be protected from such circumstances we have to move with asimpleand basic techniquecalled —3R concept.

II. 3RCONCEPT

The concept originates from Japan, from2004.

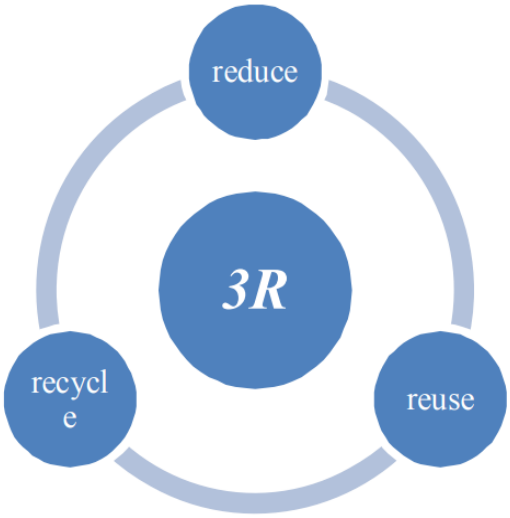

Figure 1. 3R Cycle

It calls for an increase in the share of recyclable materials, further reusing of raw materials and manufacturing wastes, and overall reduction in resources and energy used. It is the only way to save the environment. This 3R helps to decrease the amount of waste, we thrown away. They conserve natural resources, landfill space and energy.

Why need of 3R-

- Due to changing lifestyles and depletion patterns, the quantity of waste generated is increasing with quality and composition of waste becoming more wide-ranging and changing.
- Industrialization and economic growth has created more volumes of waste, including hazardous and toxic wastes.
- There is a growing recognition of the negative impacts that wastes have on the local environment (air, water, land, human healthetc.)
- Complication, costs and coordination of waste management has demanded multi-stakeholder involvement in every stage of the waste stream. So an integrated approach to waste management isneeded.
- We should look at waste as a businessopportunity

(a) To extract valuable resources contained withinit.

(b) To securely process and dispose wastes with a least impact on theenvironment

The popular and well known concept of 3-R refers to reduce, reuse and recycle .This are the great ways we can eliminate and protect our environment.

Principles of 3R REDUCE -

Concept - To make something smaller or use less resulting in smaller amount of waste .It is essential to focus on the source of the waste.

The purpose of "reduce" is to save resources and to reduce waste, in other words, to reduce the amount of natural resources input into the production process.

Reducing the quantity of production by extending the life of products or improving repair and maintenance technologies can lead to reduce the use of material.

For example – If you buying a computer then enquire it can be upgrade easily without completereplacement.

i. The best way the waste is to not produce it. This can be done by shoppingcarefully.

ii. Pack your lunch in reusablebags.

iii. We can reduce the amount of gardenwaste.

iv. Avoiding wasting paper and other material. Use only what you reallyneed.

Reuse –

The repeat use of any material is known as the reuse, is very important and difficult concept because where we live in the world it is very difficult to so see that people are reusing thematerial.

There are some concepts and ways to reuse the material –

i. If you are purchasing anything , Then purchase the second hand thing, because we can give that thing to rent or we can also borrowit.

ii. When we go any general store, maximally we carry the plastic bags instead of own clothes bags, so we should avoid this, we should carry our own carry cloth bags instead of plasticbags.

iii. Purchase any thing that can be use one time any and thrownaway.

To do thing –

1. Reuse disposables like plastic cups, plates, utensils and plastic food storage bags,etc.
2. Repair rather than replace.
3. Use canvas or cloth bags when shopping.
4. Reuse plastic bags.
5. Use empty plastic water or soft drink bottles as drink bottle for general water transportpurpose.

6. Buy product in refillable containers e.g. washing powder etc.
7. Reuse old envelope.

RECYCLE -

To use the waste material as the resources is known as the recycling. Recycling is an important factor in conserving the natural resources. Recycling is something that we can all do. Children that are school age and older can help too. The aim is to stop throwing out items that we can use again and again. It costs far less to recycle the materials than it does to create new ones.

If you are taking part in some recycling efforts than part in some recycling efforts than you should applaud yourself for doing what is good for the environment .if you aren't doing it yet don't make excuses. Don't tell yourself that it isn't that big of a deal , that you don't have time , or that it isn't worth it.

Recyclable material include many kinds of glass, paper and card board, metal, plastic, tires, textiles and electronics. The composition or other reuse ofbio-degradable waste such as food or garden waste can be done as fertilizer for plants.

Figure 2: Recycled and Reused Plastic Bottles.

Many materials can be recycled, such as paper, glass, metal, wood as well as plastic and other items such as furniture and electronic equipment's.

III. IMPORTANCE OF3R

Reduce, reuse and recycle are essential because they decrease the amount of waste on the planet and also reduce the consumption of new materials and save energy. We challenged with low cost-of-goods-sold (COGS) targets 3R can recommend how to redesign your device and optimize your processes. We need to improve product performance 3R can develop a plan for iterating your design to better meet customer and commercialneeds.

- Reduce material intensity and Reduce energy intensity.
- Reduce dispersion of toxicsubstances.
- Maximize use of renewableresources.
- Extend product durability and Increase service intensity.
- By reducing waste you save resources like water and energy.

Our focus – Is to implement 6R.

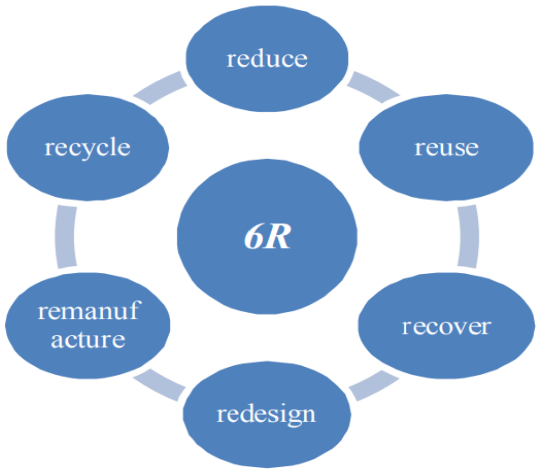

Figure 3. 6R Cycle

- **Recover** - Recover model are recover to mental disorder support a person journey rather than a set out come, and one that may be involves developing hope a secure base and sense of self, supportive relationships social inclusive coping skills.
- **Redesign** - Redesign means the repeat of design process.In this process the designing products in such a way that they are easy tomanufacture.
- **Remanufacturing** - Remanufacturing is a wide-ranging and laborious industrial process by which a previously sold, rented, used, worn or non-functional product or part is returned to a 'like-new' or 'better-than-new' condition, from both a quality and

performance viewpoint, through a organized, reproducible and sustainable process.

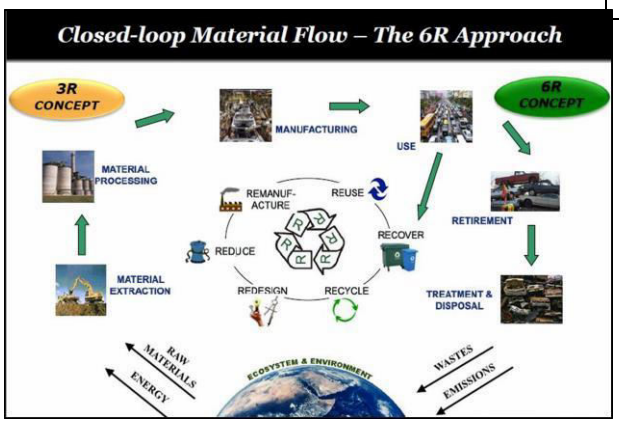

Figure 4: Closed-loop Material flow (6R

This 6R concept is based on 3R. It has new step the first three R is reduce, reuse, recycle and next 3R which are includes in 6R are recover, redesign, remanufacture which helps in total use of substance.

This diagram represent 6R concept. First we have extruded raw material converted into a final product with the help of design means the product is manufactured. Manufactured Product is used in day to day life so some days the product will be retired and it consider as disposal. This waste will recover and recover some parts can be recycled and after that part redesigned.

Some part will reduce and remaining remanufacturing which is used in ourlifecycle.

Reduce	• Reduced use of resources in pre-manufacturing • Reduced use of energy and material in manufacturing • Reduce the waste during the use stage
Reuse	• Reuse of the product or its component in order to use as the raw material for producing the new product
Recover	• Collecting, disassembling, sorting and cleaning at the end of usage stage of product
Redesign	• Simplifying future post-use processes
Remanufacture	• Re-processing of already used product
Recycle	• Converting the waste material or product to new material and product

Table1. 6R methodology in sustainability

Benefits of 6R -

6R helps in reducing pollution caused by harvesting of new raw materials.

The 6R is one of the best ways for us to have positive impact on the world which we live.

- It saves the natural resources.
- It reduces toxicity of wastematerials.
- Waste items it makes less materials decreasing waste dramatically.
- It reduces the cost, prevents economic savings, businesses and individual consumers.
- Saving the materials and energy which will be benefit to an environment.

Green ideas –

Green Ideas is the way to help of environment and we all try in every day. In our environment the most biggest industries are followed 6R concept .but we are not followed this concept. I think this is very simple concept and also we can do. The first question in our mind how to do start. So we start from simple greenideas.

i. In Home-

The best place to start the 3R in our home .Use insulation made from recycled paper, glass and other recovered materials .To think the are some products in your home made from recycledmaterials.

ii. For Student-

Before starting new year in college or school, last year materials can be reduced or recycled. Use recycled products such as pencil made from old blue jeans.

iii. In Office -

a. Save packaging and coloredpaper

b. To think the reduce amount ofwaste
c. If you possible pay online bill then save the paper.
d. To create awareness amongpeople.

iv. ForPeople:

a. Participating in this as individual'sduty.
b. Making one another and our surroundings to get rid of solid wastes in anyconcern.

IV. CONCLUSION

An operative methodology for sustainable design oriented product modularity is recommended in this paper to participate sustainable factors such as environment, economy, and society into product design process through the product representation with respect to module bunching criteria. Totally, for the basic principle of sustainable design and manufacturing the 6R concept is watched and henceforth, this article integrates 6R concept into element gathering criteria such as function, manufacturability, and end-of-life options to attain objective of sustainable design.

The success of a '3R' initiative will largely depend on the right mix of policies and programs implemented at the local level. As the Japanese experience has shown, the key spheres of action will revolve around governance issues such as laws, legislation, rules and procedures; education and awareness building issues, targeting stakeholders in the public and private sectors, but also communities and consumers alike; technology issues, to ensure that industrial, manufacturing and market activities and technologies used have a minimum impact on the environment, and produce the least amount of wastes possible; and financial issues, focusing on subsidies and taxation to facilitate action in the right direction, and to discourage unsound practices.

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