

Sustainable Manufacturing in Foundry- A practical approach

Rajesh goel, Dy. General Manager

Sigma Electric Manufacturing Corporation pvt. Ltd, India

Abstract:

“What we are producing today should not be produced at the cost of future generation.” Rapid industrialization & economic growth, continues to improve living standard but it may not continue for future generation. As foundries are recycling the metals, foundries thinks them as a part of the green manufacturing before the inception of word “green”. Foundry industry handles large quantities of processed waste materials and has the potential to emit a large quantity of carbon dioxide and other pollution in atmosphere. In reality foundries has just scratched the surface of green manufacturing and there is long way to move forward.

As foundries are mostly driven single owners and generally not considered manufacturing industries, so there is a need to shift paradigm in foundries sector from traditional manufacturing model, in which environmental activities were seen only as a additional cost; natural resources are viewed as freely available. For manufacturer; sustainability has been emerging as a new competitive requirement to achieve differentiation in market. This paper proposes a framework for development of practical model for foundries for sustainable manufacturing and improves overall performance. However, developing and maintaining a focus on sustainable manufacturing is new and difficult challenge for foundries.

Key words: -Sustainable Manufacturing, Foundries, Energy saving,

1. Introduction

After World War II, the manufacturers were struggling to survive with very limited resources. The pollution related to foundries is important due to their high potential risk to environment and human health. The main waste from casting is the spent foundry sand, which is generated at very large quantities during core and mold preparation.

Sustainable manufacturing highlights the road map of the industries for achieving performance improvement through sustainable development and its impact of organizational competitive outcomes. Some of the benefits of Sustainable manufacturing are listed below

- Controls and reduces material waste
- Preserves capital and saves money,
- Improves productivity and increases savings,
- Easy adaptability to changing rules in environmental regulations and legislation.

2. Literature Review:

Lovins (2003) suggests that from the 100% of natural capital extracted to make a product in the United States, commonly only 7% of materials become products that we end users see or use, meaning 93% becomes waste within industrial processes (this includes extractive and manufacturing waste). Out of the 7%, 1% becomes durable and 6% becomes waste from customer first use. Going further, of these 1% consumer durables, only 0.02% is recycled or remanufactured and the balance of 0.98% becomes persistent waste from disposal (typically landfill).

Beyond Greening – Strategies for Sustainable Manufacturing:-

30 years ago environmentalist Paul Ehrlich made a power full observation about SD. ***Environmental Burden (EB) = Population (P) X Affluence (A) X Technology (T)***

Stage one: Pollution prevention

This stage is governed by principal “Prevention is better than cure”. Pollution prevention focuses on minimizing or eliminates the waste before it created. Pollution prevention of Foundry Industry Like other manufacturing industries, foundries are looking towards the trends of the future to

understand the challenges which will be faced in coming year.

Stage two – Product Stewardship

The organization's need to look for Design for Environment (DFE), a tool for creating products that are easier to recover, reuse, or recycle is becoming increasingly important.

Stage three – Clean technology

Foundries with their eyes on future can begin to plan for and invest in tomorrow's technologies. The simple fact is that existing technology base in many industries is not environmentally sustainable. Cleaner technologies are desperately needed in foundries.

Process benefits of Sustainable manufacturing:-

- Material saving resulting from more substitution, reuse or recycling
- Better utilization of by-products, conversion of waste into valuable forms.
- Lower energy consumption during production process.
- Reduce material storage and handling cost.
- Elimination of cost of activities involved in discharge or waste handling, transportation and disposal.

Product benefits of Sustainable manufacturing:-

- Higher quality, more consistent products and lower products cost
- Lower packaging cost, more efficient use of resources by products.
- Lower net cost of products disposal to customer.
- Higher product resale and scrap value.

Implementation of Sustainable Manufacturing in Foundries

If we look individual continuous improvement projects, it will yield to 1% -2% saving, however it will create a great impact

cumulative. Indian foundries have taken a big drive to save energy and there is great focus by Govt of India to reduce the energy consumption in foundries. To reduce energy consumption the following steps can be taken to realize the results of sustainable manufacturing.

There is some basic and important step for saving:

1. Reuse of waste heat from furnace flue gases
2. Improvement in Air exhaust system
3. Modern lighting system
4. Compresses air pressure control
5. Reduction in cost of poor quality
6. Reduction in loss of molten metal
7. Improvement in overall system efficiency

Conclusions:

Once we have achieved the focus to think green in all aspects of our foundry, we are open to the possibilities that were only waiting for us to seize them. This focus, along with the pragmatic application of existing technology, will guarantee that the foundry industry is recognized as a sustainable leader by other industries and the public. It the time to roll up the sleeve and be on our toes to make foundries greener and efficient to save the existence of foundries. Truth is that we have big opportunities ahead of us, wheatear we are a large / medium or small foundry.

Reference

- [1] Che B. Jouna, John Carrell and Prabir Sarkara. Categorization of indicators for sustainable manufacturing. Elsevier Ecological Indicators 24 (2012) 148–157.
- [2] Marc a. Rosen, hossam a. Kishawy, sustainable manufacturing and design: concepts, practices and needs, sustainability 2012, 4, 154- 174; doi:10.3390/su4020154
- [3] Yiigit Cisem. Life cycle assessment in ferrous foundry industry, January 2013