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Energy Conservation and Environment Protection: through Green site Development in Foundry

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***Abstract*--Energy-saving technologies in green foundries should include site design, construction and use of energy saving processes. Green foundry is a concept receiving growing attention in the developing as well as developed countries around the world among both public and private sector organizations. The term "green" is identical with sustainability, which is widely defined as technology that, when implemented properly, allow an organization to resource efficient materials incorporating recycled or rapidly renewable content and more. In truth, the foundry sector has only made a superficial effort to be environmental friendly and has not yet reached the higher degree of sustainability which the future will demand.**

***Index Terms*--Green Foundry; Energy conservation, Site design; Sustainability;**

I. Introduction

THE stress on manufacturing firms to think about the Effects their processes and products will have on society and the environment has intensified during the past ten years. [1] The foundry industry's toxic wastes and acid precipitation are creating a disaster to the eco system. Even more concerning, corporate-related products and production methods are at the basis of numerous environmental catastrophes, such as depletion of ozone layer, global warming, deforestation, and biodiversity loss. These environmental issues are alarming the general populace. Concerns about environmental deterioration and the sustainability of the Earth's natural systems are widespread. It's possible that the environmental obligations we leave for future generations will be too much for them to handle. We require new organisational and economic concepts and approaches to handle these issues. A solution to the previous industrialization's ecological devastation is sustainable development. [2] Several sectors, including engineering, manufacturing design, and the economics, have adopted sustainability. [3] For years, foundries have viewed them as recyclers. Following the pouring of the first metals, it has been understood that recycling previous iron cast is the quickest way to create new castings and repurpose cast-off items. Eventually, metal scrap was added as a second

feedstock to change mixtures to accomplish the same thing. Most foundries consider themselves to be part of green technology today due to metal recycling, but in truth, the higher level of sustainability that our planet requires has not yet been attained by the foundry sector.Due to the enormous potential damage to the environment and to human health, foundry pollution is significant. Spent foundry sand, which is produced in enormous amounts during core and mould preparation, is the primary casting waste. [4]

A green technology is what? The definition of "green technology" might change depending on the group or sector. Green technology, which is synonymous with sustainability, is usually referred to as technology that, when used appropriately, enables a company to achieve its immediate demands without sacrificing its long-term objectives. Green technology may reduce wastages in the production process and employ substitute manufacturing techniques that have the least harmful impacts on environment, the health of people, and the earth's natural resources. There are numerous ways to reduce waste during the production process. No matter the media, all waste streams leaving the facility must be assessed for potential reductions. Production procedures must be as self-sufficient as possible, with recycled process materials used without adding excessive energy requirements. [5]

The term "sustainable development," which was first used in a report by the World Commission on Environment and Development of the United Nations, is derived from the word "sustainable." According to this definition, it is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs," [6] and its objective is to stop unnecessary and further environmental degradation. Manufacturers are become more and more concerned with the sustainability issue. When society uses resources and generates trash at a rate that exceeds nature's capacity to convert industry and societal wastes into

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environmental nutrients and resources, a system may be considered to be unsustainable. [7]. The phrase "sustainable development" refers to economic and social progress that satisfies existing needs without compromising the ability of future generations to do the same. [8]. In light of this, the notion of sustainable development encompasses social, ecological, and economic goals and calls for maintaining the integrity of resource exploitation as well as the direction of investments, the orientation of technical growth, and institutional change. [9]

Natural features in undeveloped areas can have environmental advantages for foundries. Effective analysis to identify and comprehend natural systems can make it easier to integrate drainage systems when designing a new project. Undeveloped areas are frequently best viewed as components of a system of multiple-use open spaces that may accommodate storm water as well as provide room for trails, bike routes, wildlife habitat, groundwater refill, and aesthetic qualities

II. LEED SUSTAINABLE SITES

The US Green Building Council LEED's sustainable sites standards emphasize the significance of eco-friendly storm water management practices [10]. The prevention of erosion and sediment control is a requirement for this category. Moreover, ideas or methods for storm water management that increase the quantity and rate of storm water are given one credit point. For plans and techniques that concentrate on treating storm water, one credit point is also given. In the category of water efficiency, using no potable water or no irrigation grants a credit point in addition to the credit point provided for decreasing landscape irrigation requirements by 50%.

A. Green Roofs

Although green roofs might not the first storm water management method but they are a crucial tool for lowering storm water runoff from commercial buildings. Above a waterproof covering, green roofs frequently have vegetation and many drainage layers [11]. They absorb, filter, and hold precipitation using vegetation and specially formulated lightweight soil combinations. Due to soil's organic processes and plants' use of it, green roofs may also help reduce pollution. Lead, zinc pyrene, and chrysene are a few contaminants that conventional roofing systems can release into storm water runoff [12]. Typically, there are three types of green roofs: intensive, semi-intensive, and vast [13]. Also, they differ from roof gardens, which are often created for human use and which might or might not offer some of the same advantages as green roofs. Extensive green roofs contain fewer growing media and substrate than intensive green roofs, which often have more than 15 cm. More than 25% of a hybrid green roof's surface area is of one kind, and the remaining 25% is of another [14].

Fig. 1. Photographic view of green roofs at the CII-Sohrabji Godrej Green Business Centre (CIIGBC), Hyderabad, India .

Reduced urban heat island effects, higher energy efficiency due to better thermal insulation, improved noise absorption, and longer roof durability are other advantages of green roofs. Figure 1 depicts the green roofs at Hyderabad, India's CII-Sohrabji Godrej Green Business Centre (CIIGBC) (Architect: K G & Associates, Energy Consultants: TERI). During the initial erection of a building in a foundry, green roofs are most conveniently and economically placed.

B. Green Streets and Parking

Storm water runoff that finally enters water channels is contaminated and produced in greater quantities by conventional streets and parking lots. In some foundries, streets may have up to 40–50% impermeable surfaces. Most commercial developments that produce fewer than 500 average daily trips (ADT) per year can use narrower streets, possibly with widths of 22 to 26 feet. For streets with 500–1,000 ADT, narrower roadways might also be practical. [9].

Fig.2. Photograph shows grass swale alongside a narrow street

Figure 2 depicts a grass swale next to a constrained street. A range of environmental challenges in the foundry sector can be addressed by green parking. They are major contributors to the urban heat island effect due to the huge areas covered by several parking lots that are surfaced with asphalt or concrete. They produce a significant amount of storm water runoff and store a substantial chunk of contaminants that are flushed into rivers and streams during storms [15]. There are numerous ways to incorporate green design principles into parking areas. Limiting the area used for parking is one of the key tactics.

C. Porous or Permeable Paving

Permeable pavers, porous asphalt, pervious concrete, and grass pavement systems are a few examples of porous paving surfaces. All enable rain and snowmelt to pass through while offering differing degrees of structural support. With porous pavements, however, fine materials are removed, leaving spaces that let water pass through. Portland cement, coarse aggregate, and water are combined to create pervious concrete. When there is enough void space, water can percolate through the pavement. Similar to regular asphalt, porous asphalt is made of coarse aggregate and asphalt cement. Also, it contains enough gaps for water to seep through. Increasing the size of the stone reservoir or addingperforated pipes to the upper layer of the reservoir to remove extra runoff once the reservoir is full are two ways these systems might provide more storage.

D. Alternative paving system

Another type of permeable pavement that can be used in place of conventional asphalt and concrete paving is alternative paving systems. Paving , cobbles, gravel, or mulch are other examples. Although cobbles have been widely employed throughout Europe for many streets, these systems work best in driveways, parking lots, and walkways. Figure 3 shows paving blocks with grass in the parking lot. High traffic volumes also make it difficult to maintain a healthy grass growth. Crushed stone can be used in place of grass, which is less aesthetically pleasing and less effective at lowering the urban heat island effect, but still providing the same benefits for storm water management. Using a structural support system underneath the surface, this technology offers a continuous grass surface.

Fig.3 .A view of paving blocks planted with grass

This system's issues are caused by incorrect installation and excessive use. The grass surface won't regenerate properly due to overuse. Overuse can cause harm to the grass surface, although normal use patterns are uncommon, and the grass will naturally regenerate. Similar maintenance procedures, including as fertilization, irrigation, and mowing, will also be necessary for this type of system.

E. Constructed storm water wetlands

Storm water wetlands are a useful tool for cleaning up polluted runoff. These mechanisms are made to remove pollutants from the water as storm water passes through the wetlands [16] through settling and biological uptake. Storm water wetlands are ideally suited for the specialised task of treating storm water and will differ from a natural wetland in terms of composition and functions. A prominent characteristic of constructed wetlands is a lower richness of plant and animal life, as well as varying levels of shallow and deep water and dry storage area [17].Figure 4 shows a constructed wetland that storesstorm water runoff from a residential development [18]**.**

Fig. 4.A photographic view of constructed wetland to store storm water runoff.

The pond/wetland system combines a shallow marsh with a deeper wet pond (2–2.5 m). A persistent pool is maintained due to the pocket wetland's intersection with the groundwater. With little drainage going into the pool, this technique might work. Gravel-based wetlands enable runoff to pass through rock filters with surface-growing wetlands. The plants absorb pollutants, and the rocks also eliminate them through biological activity. This system is fundamentally different since it functions more like a filtering system than a wet pond.

III. ENERGY CONSERVATION

A. Reuse of waste heat

Reusing waste heat can save energy 15% to 25% or more. Directly recovering waste heat for use in a location that needs heating is an easy and less expensive strategy. The direct reintroduction of the expelled, filtered air back into the plant is the simplest method of recycling bag house heat energy. If there aren't any other gaseous waste contaminants in the waste air stream, this is doable.

B. Lighting system

Lighting for plants and offices can also save a lot of energy. As lighting is used in all sectors of the economy and the difference between old and new lights makes it simple to measure improvements, many governmental organizations and electricity companies have turned this into a market with sizable accessible refunds and tax advantages.

C. Compressed Air

One third Of the compressed air's horsepower is lost during the inefficient production and transportation of compressed air. a supply-demand side analysis, along with a system leak analysis, can be very profitable. Savings are often made in low-investment activities including leak repairs, piping changes, optimum compressor sequencing, and air storage sizing.

D. Other areas for savings

All heated ductwork's insulation must be maintained to keep process heat where it belongs. Heat leakage may be acceptable as an additional building heat source in the winter, but in the summer, it increases the plant's temperature burden and must be drained from the building. Calculate the heat losses and do routine ductwork inspections. The cost of insulating ductwork and plumbing will nearly always be rapidly recouped. [5]

IV. CONCLUSION

The present trend of expanding impermeable surfaces may be changed by using green site design techniques that concentrate on environmentally friendly storm water management. With improved awareness and the support of the government, which oversees and approves new building and redevelopment projects, many of these techniques are immediately affordable and can be put into practice. Some industries have already made the decision to adopt green infrastructure techniques, and more are adjusting norms and procedures to make room for fresh concepts.

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VI. BIOGRAPHIES

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