Value Extraction And Solid Waste Management In An Integrated Iron And Steel Industry

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Abstract- *This report address the recycle and reuse of waste generated from integrated steel industry. The present work carried out in vijayanagara steel works, Toranagallu. Various types of solid wastes generated during iron making and steel making, namely dust, sludge, mill scale and slag. These wastes are characterized by XRF analyser and carbon sulphur analyser. Based on percentage of iron waste produced will be sent to suitable waste handling facilities, namely micro pellet plant, mill scale briquetting, waste to wealth plant, slime recovery plant, slag sand preparation plant and secondary sales. wastes produced classified as high iron waste, medium iron waste and low iron waste. high iron waste will be send to MSB, medium waste will be send to MPP and low iron waste send to WWP. waste recycled in MPP utilized in Sinter Plant, waste recycled in MSB utilized in BOF as coolant. sludge, dust, mill scale utilization per day is 3914 tonnes, slag utilization per day is 23451 tonnes and slag utilisation more than generation in JSW steels. Modified recipes suggested to produce 2300 TPD and 2600 TPD of micro pellets having more strength. moisture content, green compression strength and drop number tests were conducted with the modified recipe for MP production. Results shows that strength increased after coating of dust. Utilisation of solid waste generated reduces impacts on environment and also increased cost benefit to the industry.*

Keywords- Chemical Analysis, Recycle, Recycle, Solid Waste, Waste Handling.

I. INTRODUCTION

Destruction of the environment is the crucial issue connected with the active growth of industries, urbanization and the worth of living of human being. Increased base trade for basic resources for the industrial production, non-renewable resources are diminishing or reducing. Hence, Attempts are to be required for managing impurities arising out of dumping of unwanted things into reusable resources for the different convenient or suitable uses. Steel products and the by-products are outstanding in reduce, reuse and recycle. Indian industries are yet to approach higher standards in terms of waste minimization. Mineral processing and metal production part comes under the increased pressure to enhance sustainability of its operations, specially by reducing consumption of energy, emission of green house gases and dumping of waste. In the industrial activities global environmental compliance is considerable objective.

Unwanted Substances or solid wastes formed in the steel sector are by-product plant of coke oven, refractory substances plant, BF, BOF, sinter plant, RM, SMS. Various SW generated from steel industries namely coal and coke dust, slag, from SMS, blast furnace slag, scrap, mill scale, etc. disposing of these wastes into open space or land which is excavated leads to pollution of environment. 63% of waste generated will be dumped in india which is more essential to reuse or recycle to aim a zero waste it has to done in many developed and developing nations also. Many steel sectors have already considered innovation for cent percent usage of produced wastes. This innovation not only decreases the cost of disposal and pollution to the environment, also gives raw materials to the iron making. In an integrated steel industry two to four tonnes of wastes including gaseous, liquid and solid wastes produced for the one tonne of steel. Nowadays, emphasis is on the reduction of generation of waste, recycling, reuse of waste and lowering the effect of dumping to the atmosphere. Disposal of solid waste generated from the various steel industrial practices are the key concern. Consequently Reduce, Reuse, and Recycle (3R's) philosophy and efficient management of waste is reqiured to be implemented by the steel industry.

Need for the Waste Management in an Integrated Steel Plant

Something useless is considered as waste. But something unwanted in one state may be of value in other and unusable in one trade may beneficial be used in some another trade. Waste management subject in a cost effective and eco-friendly viewpoint is gaining foot for safety of environment and source of value added wealth from waste. Advantage of such a recycling

(a) Lower Specific Consumption of Basic Raw Materials
(b) Lower Production Cost
(c) Higher Product Yield and
(d) Lesser Pollution and Better Environment.

Study Area Description: Vijayanagara Steels at Toranagallu Located in the Year 1994 in the Region of the HOSAPETE-BALLARI. Area Spread over the 10,000 Acres. Latitude 15.9^0 N and Longitude 76.5^0 E. Distance from the Ballari is 30 km and 35 km from the Hosapete. Elevation of Site 478 m above the MSL.

Fig: Map View of Vijayanagara Steel Limited

II. METHODOLOGY

Material Details

Solid Waste Generated from Different Plant Operations

- Solid Waste generated from Blast Furnace
- Solid Waste generated from Corex Plant
- Solid Waste generated from SMS #1 &2
- Solid Waste generated from WRM
- Solid Waste generated from BRM
- Solid Waste generated from HSM I&II
- Solid Waste generated from DRI
- Solid Waste generated from Lime Calcination Plant
- Solid Waste generated from CRM #1&2

These samples have been characterized in respect of their chemical properties and aspects of possible recovery of any value-added products from some of them have been attempted.

Chemical Analysis

The objective of chemical analysis is to determine the chemical composition of the waste materials by different established techniques and distinguish the characteristics of one waste from the other by chemical means. The major, minor and trace constituents in different wastes were taken up by wet chemical methods and using different instrumental techniques such as XRF and CS Analyser.

Samples were collected at the source of generation of wastes from different plants. the samples were tested in the laboratory with respect to the chemical characterization using XRF instrument and carbon sulphur analyser.

Procedure for Utilizing the Waste

Technical Analysis of Produced Solid Waste

- Produced Solid Waste from Various Plant Operations Classified as Four Categories namely Sludge, Slag, Mill Scale and Dust.
- To be analysed for chemical properties of wastes.
- Based on Fe values, wastes categorized into four types namely high iron waste, medium iron waste, low iron waste and the tailing.

Choice of Utilization Facility

- Handling/utilization/disposal method has to be decided as per the Fe gradation.
- High Fe waste recycled in MSB, medium Fe waste recycled in MPP, low Fe waste reused WWP and Tailing of all systems used in SRP to recover Fe value.
- Iron waste which can't be reuse or recycle has to be sold.

Distraction of waste Based on Characterization

- This will reduce process loss, utility loss and unwanted processing.
- As per Fe content distraction of waste has to be done for effective use.
- Slag can be Sold or can be processed to fine aggregate or can used in road making or can be utilized depending on iron value.

III. RESULTS AND DISCUSSIONS

Total generation of mill scale, sludge and dust 4064 tonnes per day, total utilization 3914 tonnes per day through various waste handling facilities like MPP, MSB, WWP and sale and it is shown in Fig 4.13. total utilization of sludge, dust and mill scale in an industry per day 96.31% and 3.69% will be dumped. Dry pit slag generation per day is 1050 tonnes and utilization is 1050 TPD, hence cent percent of utilization of dry pit slag. 598 tonnes used in bund construction and 855 tonnes per day sold to Gammon India. 11600 TPD Iron making slag produced from the industry, 4532 tonnes per day sold to cement plants, 8639 tonnes per day used in JSW cement plant, 1402 tonnes per day used to slag traders, 748 tonnes per day screened slag sold. Total 100% utilization of iron making slag. 7080 TPD SMS slag

is produced from industry, 1174 TPD used in converters, 297 tonnes per day used in iron making, 205 tonnes per day used in MPP, 1176 tonnes per day used in PS Ball and sold to Gammon India, 824 tonnes per day landfilling and 3404 tonnes per day used in bund construction. Total 89% of SMS slag is utilized and remaining 11% of slag is being landfilled. Total slag generation is 19730 TPD and utilization per day 23451 tonnes. Hence utilization of slag is more than the generation.

IV.CONCLUSIONS

- To define sources, quantities and types of SW generated from various processes in an integrated steel industry waste audit is necessary.
- Solid waste produced in an iron making and steel making plants should be well characterized with respect to valuable and undesired components.
- Advanced technology with the economic benefits for minimizing waste of resources to be evaluated.
- Research and development efforts in this field is much essential for making the waste management not only successful venture also a beneficial business.
- Extent of reduction, recycling, reuse and restoration of soild waste to make zero waste generation is a big challenge to the steel industry nowadays.
- Avoid secondary pollution while treating the waste as raw material.

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