Studies on Energy Consumption of Melting Furnaces and Energy Conservation Options in Foundries

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ABSTRACT

Energy deficiency has been a source of concern to all nations and particularly countries like India, which has yet to reach the state of self-sufficiency in the various energy sources. To overcome the problems of energy deficiency, increasing cost and growing demand, a whole hearted effort should be made to conserve and optimize the energy available and utilize the resources to full extent. Conceiving the fact that metallurgical industries and foundries are highly energy intensive, this paper discusses some of the options to obtain maximum of energy performance of foundry units based on a comprehensive literature survey and valuable inputs obtained from the experts and workers amongst the organized foundry units that authors have visited and interacted. Based on the energy conservation studies, it was observed that a reduction from an existing 680 kWh to an optimum specific energy consumption of 500 kWh per tonne of liquid metal amounts to a potential saving of rupees 2 lakhs per year on energy cost for a unit producing 350 tonnes of light steel eastings per year (at an average yield of 58%). Guidelines in regard of energy conservation in foundries are also presented.

KEYWORDS: Are Furnaces, Induction Furnaces, Energy consumption and Energy Conservation

1. INTRODUCTION

At the time of independence the installed capacity of power in India was 1362 MW constituting only thermal & hydro and now grew to above 1 lakh MW. Projected demand by 2012 is 2.5 lakhs MW. Corresponding to a marginal increment in electricity production to a total of 693.4 crore unit, state power consumption is increased to 5 million units per day during the last one year [1]. This growing demand and rising cost of electricity coupled with interrupted power supply have spurred a great deal of interest in conservation in many quarters. The main reason that its achievement is fraught with difficulties is the non availability of information on (i) norms for energy consumption (ii)break up of energy balance, which can enable probing into the conservation possibilities in a scientific manner.

Energy audit is an efficient tool in defining and pursuing a comprehensive energy management programme. Careful audit will provide the organization a plan with which it can effectively manage the plant energy system at minimum energy cost. Understanding and implementing the energy conservation principles and guidelines would be useful for industries in combating escalating energy costs and thus to reap several other benefits like improved production, better quality, higher profits, lower emissions etc. In the beginning of nineties, India witnessed a number of studies on

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Energy Conservation and Utilization in Foundries K. S. B. Rose, 1981 Energy Conservation and Utilization in **Canadian Industry Program for Energy Conservation**, 2000 Foundries K. S. B. Rose, 1981 **Energy Research and Development Projects in the Nordic Countries. Directory 1988**, This is the seventh directory of research development and demonstration projects carried out within the field of energy and of energy related subjects in the Nordic countries The directory incorporates projects in progress during 1989 2209 projects most of which are financed by special public funds are described In addition to projects concerning energy sources energy utilization and energy conservation the directory also includes descriptions of research on environmental ecological and socioeconomic issues etc where these are related to the main subject The directory thus provides direct access to topical information relevant to a very comprehensive field of research In the appendices the organization of the Nordic Energy Research Programme and of energy research in each Nordic country is explained and the content and uses of the Nordic data base Nordic Energy Index are described Names of people to contact addresses telephone numbers and other useful information can also be found in addition to details about newsletters providing information on current research in some of the Nordic countries *Annual Report to the Congress* and the President Industrial Energy Efficiency Improvement Program (U.S.),1978 Foundry Management & Annual Report Industrial Energy Efficiency Improvement Program (U.S.),1978 Technology, 1981 Energy Research Abstracts .1995 **Engineering Equipment for Foundries** Sam Stuart, 2016-02-26 Engineering Equipment for Foundries covers the proceedings of the Seminar on Engineering Equipment for Foundries and Advanced Methods of Producing such Equipment held in Palais des Nations in Geneva Switzerland on November 28 December 2 1977 This seminar is organized by the United National Economic Commission for Europe This book is organized into five parts encompassing 39 chapters Part I focuses on the economic problems of the foundry industry particularly in connection with reduction of labor requirements and in calculating foundry production capacity Part II highlights the problem of environmental pollution created by different branches of metallurgy while Part III deals with the general problems concerning practices and technological developments in the foundry industry Part IV describes the technological advances in molding and coremaking processes in foundry This part also discusses the reduction of waste energy in permanent mold and die casting foundries Part V considers the transition to process and production automation of foundry equipment This book will prove useful to metallurgical engineers manufacturers and researchers Proceedings of the Mineral Waste Utilization Symposium, 1978 **Annual Report** United States Department of Energy. Division of Industrial Energy Conservation, **Proceedings of the International** Conference on Environmental Management in Metallurgical Industries (EMMI-2000) ,2000 Energy and the Modular Systems for Energy Usage Management Yatish T. Shah, 2020-01-22 a very unique book that Foundry .1977 integrates benefits of modular systems for enhanced sustainability to meet the global challenges of rapid and sometimes

uncontrolled industrialization in the 21st century Pinakin Patel T2M Global This book examines the role of the modular approach for the back end of the energy industry energy usage management It outlines the use of modular approaches for the processes used to improve energy conservation and efficiency which are preludes to the prudent use of energy Since energy consumption is conventionally broken down into four sectors residential transportation industrial and commercial the discussions on energy usage management are also broken down into these four sectors in the book The book examines the use of modular systems for five application areas that cover the sectors described above buildings vehicles computers and electrical electronic products district heating and wastewater treatment and desalination. This book also discusses the use of a modular approach for energy storage and transportation Finally it describes how the modular approach facilitates bottom up top down and hybrid simulation and modeling of the energy systems from various scientific and socioeconomic perspectives Aimed at industry professionals and researchers involved in the energy industry this book illustrates in detail with the help of concrete industrial examples how a modular approach can facilitate management of energy usage Guide to Energy Efficiency Opportunities in Canadian Foundries Canadian Industry Program for Energy Conservation, Canada. Natural Resources Canada, Canadian Foundry Association, 2003 Pocket Guide Foundry 2019 Dipl.-Ing. Simone Franke, 2019-06-01 Ongoing technical training familiarisation with new developments and studying current research results are key components of everyday working practices The Pocket Guide Foundry is intended to provide appropriate information and offer inspiration in addition to supporting the development of technical contacts It is not merely a helpful complement to vocational training studies or continuing education but also serves as a straightforward reference for practitioners and suppliers in the foundry industry for design engineers production engineers and readers with technical interests Federal Register ,1977 Statistical Reference Index ,1980 Transactions of the American Foundrymen's The Recirculation of Industrial Exhaust Air National Institute for Society American Foundrymen's Society,1921 Occupational Safety and Health. Division of Physical Sciences and Engineering, 1978

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