ABSTRACT

At present there is a growing concern in the foundry sector about energy consumption and overall productivity. The energy cost of the foundries shows a steep increase year by year. About 32% of the Indian foundries have established quality control facilities, while only 9% of them have research units. In terms of energy consumption the range in Indian situation is 700-900 kWh/ton, while in developed countries it is 540 kWh/ton only. As far as the rejection is concerned, it is in the range of 7-8% in India, whereas the same in developed countries it is 1-2% only. The productivity index of the Indian foundries scores 45 as against 225 of Japanese foundries. From the point of view of both energy efficiency and environmental improvement, reducing energy consumption is of paramount importance to the foundries. Large foundries can engage energy consultants to advise them on energy conservation measures. These consultants can study the energy utilisation pattern in detail and work out an effective plan for energy saving. However, small and medium scale foundries often lack technical personnel, knowledge and equipment to carry out energy saving analysis.

The present study reveals the areas of energy wastage and energy efficiency of small and medium scale foundries. This involved first identifying and establishing energy accounting data and then routing and developing energy management process. The study of utilities like motors, compressors, lighting and melting furnaces provide credible evidence of improvement. The power factor and load factors have shown significant effect on energy consumption. Yield, capacity utilisation and loss factors have shown influence

on energy and fuel consumption. Capacity utilisation for industrial process revealed the basic understanding of the performance of current process and a quick insight into the problems and inadequacies. Some significant relationships between benchmarking and energy savings were observed. In the present study, effective energy monitoring and targeting approach is studied. The Decision Support System (DSS) proposed in this study contains a database structure for information, and provides the tool for calculating, displaying, and graphing the results. The program model implements the Energy Management System (EMS) methodology and demonstrates the concepts in an integrated environment. The energy management system is the effective potential solution to study the current environmental issues especially CO_2 emission. The variables constituted in this study are total energy consumption, energy efficiency, energy cost, yield and losses. The present work proposes the tools and methods useful to small and medium scale foundries to carry out energy assessment efficiently. The mathematical correlation developed in this work for energy consumption assessments is found to be effective and very useful for the above mentioned categories of foundries. The findings of this study are of special significance in understanding the dynamics of foundry energy management.