

Installing energy efficient electrical resistance furnace of suitable capacity for melting aluminium

Tags

Type: Unit case study

Sub-sector: Foundry

Location: Kolhapur

Partners: GEF, World Bank, SIDBI, BEE, TERI, IIF–Kolhapur chapter, Kolhapur Engineering Association

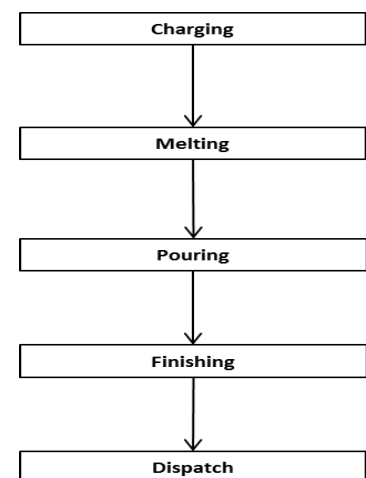
Year: 2012–14

Cluster background

Kolhapur (Maharashtra) is one of the important foundry clusters in India. The cluster has around 300 MSME foundries producing about 600,000 tonne of castings annually, comprising both iron and aluminium castings. The production capacity of the foundry units varies from less than 1000 tonnes to over 10,000 tonnes per annum (tpa).

Unit profile

The MSME foundry unit **K4** manufactures aluminium castings. The annual production of the unit is about 1010 tonnes. The total annual energy bill of the unit was about Rs 102 lakhs. The major process steps involved in the production of aluminium castings include mould preparation, melting, pouring, knockout and finishing. Aluminium ingots are melted in an electrical resistance melting furnace. The molten metal is mixed and melted with alloying elements and some raw aluminium in an electrical induction furnace. The molten alloy is poured into moulds. After cooling, the moulds are knocked out to remove the castings, which then undergo fettling and machining to give the finished products.



Energy consumption

The major energy consuming equipment used in the unit were the electrical resistance furnace, electrical induction furnace, and electrical motors associated with process equipment such as air compressor, cooling tower, pump, etc. Electricity from grid is the major energy source used in the unit. The total annual energy consumption was calculated to be about 121 tonnes of oil equivalent (toe).

Intervention

The energy audit revealed that the resistance furnace was consuming less power for melting aluminium than the induction furnace, i.e., it was relatively more energy efficient. However, the resistance furnace was found to be of small capacity (200 kg), and hence the unit was in the practice of melting some of the required aluminium in the induction furnace leading to overall increase in energy consumption.



L -Existing small capacity resistance furnace;
R - Large capacity resistance furnace

The unit replaced the small capacity resistance furnace with a large capacity resistance furnace, avoiding the use of induction furnace for complete melting

As per the recommendations of the energy audit, the unit replaced the small capacity resistance furnace with a larger, 500 kg capacity resistance furnace for melting aluminium. The annual energy saving was estimated to be 238,360 kWh, equivalent to Rs19.2 lakhs. The investment made towards installation of the 500 kg resistance furnace was Rs 6.7 lakhs, giving a simple payback period of 0.4 years.

