

# Switchover from furnace oil fired furnace to electrical conduction furnace in aluminium melting

## 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

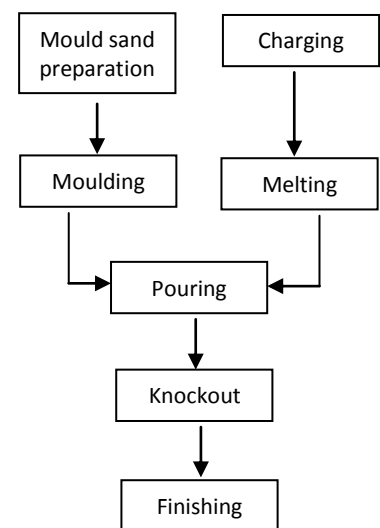
Kolhapur (Maharashtra) is one of the important foundry clusters in India. The cluster has around 300 MSME foundries producing about 600,000 tonne of castings annually, producing both iron and aluminium castings. The production capacity of these units varies from less than 1000 tonnes to over 10,000 tonnes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

## Unit profile

The MSME foundry unit K2 manufactures aluminium castings. The annual production is about 70 tonnes. The annual energy bill of the unit was about Rs14 lakhs. The major process steps are mould sand preparation and charge preparation followed by melting, pouring, knockout and finishing. The dies are pre-heated and coatings applied on them. The charge is melted in a melting furnace, and the molten metal is poured into the dies. After cooling, the dies are 'knocked out' to remove the castings, which then undergo fettling and machining to give the finished products. The unit was using a melting furnace fired by furnace oil (FO).

## Energy consumption

The major energy consuming equipment used in the unit were the FO-fired melting furnace and electrical motors associated with process equipment such as air compressor, fan, pump, etc. The annual energy consumption of the unit was calculated to be 75 tonnes of oil equivalent (toe).



Production process in a foundry

## Intervention

The FO-fired melting furnace that was being operated by the unit had a capacity of 100 kg. The specific energy consumption (SEC) of the FO-fired furnace was calculated to be 0.213 toe per tonne of molten metal, which was very high for this category of furnace.



L-FO-fired furnace; R-Electrical conduction furnace

The unit replaced its inefficient FO-fired melting furnace with an energy efficient electrical conduction furnace

As per the recommendations of the energy audit, the foundry unit replaced the inefficient FO-fired melting furnace with an energy efficient (EE) electrical conduction furnace of 24 kW rating and 125 kg crucible capacity, with digital temperature controller. By implementing this measure, the unit has reduced its annual energy consumption by about 20.2 toe, which is 27% of the unit's overall annual energy consumption and equivalent to an annual saving of Rs 8.4 lakhs. The investment made towards installation of the EE electrical conduction furnace was Rs 3.9 lakhs, giving a simple payback period of 0.5 years. The GHG reductions with the EE conduction furnace are about 43 tonnes CO<sub>2</sub> per year.

