

MSME foundry unit reduces energy bill by 27% through energy efficiency measures – recovers investment within 2 years

Background

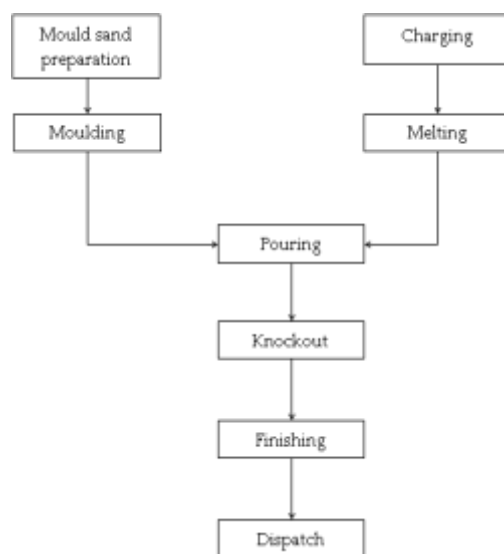
Kolhapur, in Maharashtra, is a foundry cluster. It has around 300 MSME foundries producing about 600,000 tonnes of castings annually, accounting for about 7–8% of India’s total castings production. The production capacity of these units varies from less than 1000 tonnes to over 10,000 tonnes per annum (tpa).

Unit profile

M/s K15 is an MSME unit manufacturing graded cast iron (CI) and spheroidal graphite iron (SGI) castings. The annual production is about 1594 tonnes. The total annual energy bill of the unit was about INR 127 lakhs. The total annual energy consumption was about 152 tonnes of oil equivalent (toe), in the form of grid electricity.

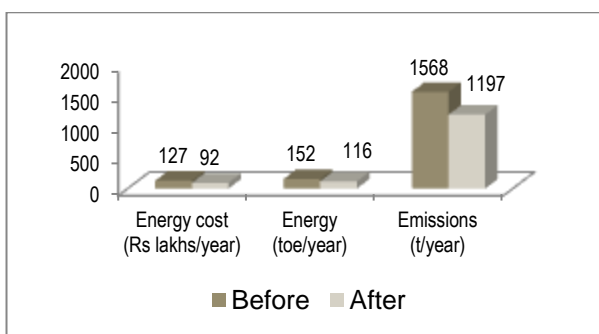
Process description

The major process steps are mould preparation, melting, pouring, knockout and finishing. Fresh sand is mixed with adhesives in a sand mixer and then pressed into mould casings. The charge is melted in an induction furnace. The liquid metal is poured into the moulds, which are left to cool and then ‘knocked out’ manually to yield the castings. The sand is reused. The castings are sent for shot blasting, machining, and heat treatment to give the finished products.



The major energy consuming equipments used were the electrical induction melting furnace, and electrical motors associated with process equipment such as reaction vessels, pumps, etc.

Overall Impact: post- implementation



Overall Impact
 27% reduction in total energy bill (i.e. annual savings of INR 35 lakhs) with a simple payback of 1.7 years

This case study has been prepared under WB GEF Project titled “Financing Energy Efficiency at MSMEs in India”. The project aims to identify, design & implement Energy Efficiency (EE) solutions in 500 MSMEs in 5 clusters with potential of EE investment of more than Rs. 100 crore and reduction in GHG emissions equivalent to 1.2 million tonne CO₂. This project is being co-implemented by Small Industries Development Bank of India (SIDBI) and Bureau of Energy Efficiency

INTERVENTIONS

Replacement of existing transformer with low loss transformer

Baseline Scenario

The overall rated efficiency of the unit's existing transformer was very low because the no-load and full-load losses were high (1.41 kW and 13.83 kW).

Recommendation

The unit was advised to replace the existing transformer with a low loss transformer of the following specifications: rating—1250 kVA; no-load loss—2.1 kW; full load loss @ 75deg—10.63 kW.

Implemented Scenario

As advised, the unit replaced its existing transformer with a low loss transformer of the recommended specifications. This investment of INR 10.8 lakhs is saving 49,431 kWh annually, equivalent to INR 4.1 lakh. The simple payback period is 2.6 years.

Replacement of existing induction furnace with new induction furnace

The unit was operating an induction furnace of 350 kW rated capacity (500 kg crucible capacity). Its specific energy consumption (SEC) was high, at 665 kWh/tonne melt. As advised, the unit replaced this furnace with an energy efficient 650 kW induction furnace of same capacity, having SEC of 550 kWh/tonne melt. This investment of INR 49.6 lakhs is saving 273,077 kWh annually, equivalent to INR 22.6 lakhs. The simple payback period is 2.2 years.

Energy efficient lighting

As advised, the unit replaced its existing 40W FTLs having copper ballasts with 28W FTLs having electronic ballasts, and 250W MVLS with metal halide lamps. This investment of INR 0.8 lakh is saving 10,130 kWh per year equivalent to INR 0.8 lakh, with a simple payback period of one year.

Reducing compressed air leakages

The unit's three air compressors showed leakages of 30%, 15% and 16% respectively. As advised, the unit arrested the leakages at no cost. This measure is saving 33,096 kWh annually, equivalent to INR 2.8 lakhs.

Reducing tapping temperature

Melt was being heated and tapped at 1538° C, which was 18°C higher than required (1520 °C). As advised, the unit reduced the tapping temperature to 1520° C at no cost. This measure is saving 19,897 kWh annually, equivalent to INR 1.7 lakhs.

Optimizing air pressure setting

As advised, the unit changed the air pressure settings in its three compressors to match process requirements. At no cost, this measure is saving 31,407 kWh annually, equivalent to INR 2.6 lakhs.

Support provided under the project

- Walk-through & Detailed energy audit
- Identification of energy efficiency interventions in the unit
- Finalization of specifications for the energy efficiency interventions
- Identification of technology providers/vendors
- Facilitation for interactions between unit and technology providers;
- Technical support during commissioning
- Monitoring & Verification

Disclaimer: This case study has been compiled by TERI on behalf of SIDBI under WB-GEF Project. While every effort has been made to avoid any mistakes or omissions, these agencies will not be in any way liable for any inadvertent mistakes/omissions in the publication.

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