

MSME foundry unit invests Rs 6 lakhs in energy efficiency measures – and saves Rs 38 lakhs every year!

Background

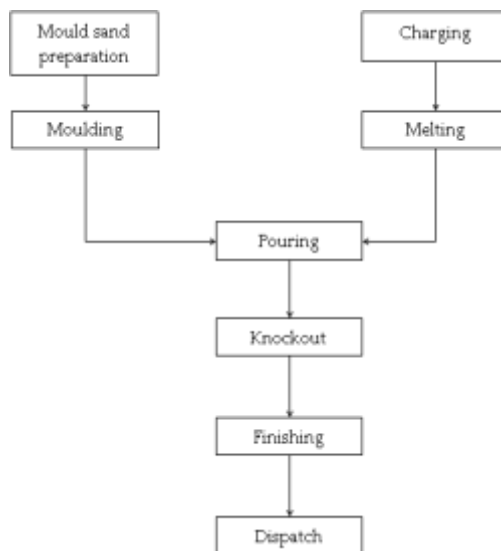
Kolhapur, in Maharashtra, is a foundry cluster. It has around 300 MSME foundries producing about 600,000 tonnes of castings annually, accounting for about 7–8% of India’s total castings production. The production capacity of these units varies from less than 1000 tonnes to over 10,000 tonnes per annum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

Unit profile

M/s K18 is an MSME unit manufacturing graded cast iron (CI) castings. The annual production is about 7691 tonnes. The total annual energy bill of the unit was about INR 485 lakhs. The total annual energy consumption was about 608 tonnes of oil equivalent (toe), in the form of grid electricity.

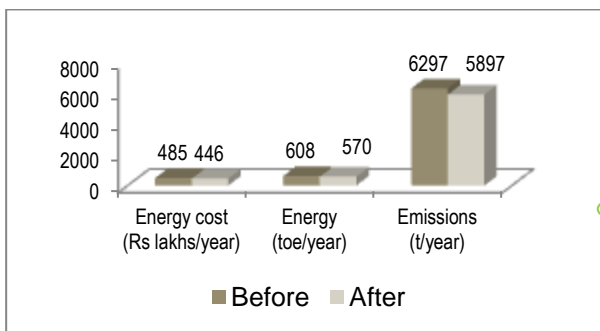
Process description

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
 8% reduction in total energy bill (i.e. annual savings of INR 39 lakhs) with a simple payback of 0.2 year

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

Lid mechanism for crucible of induction furnace

Baseline Scenario

The unit was operating two induction furnaces of 550 kW rated capacity (500 kg capacity of crucible) for melting. Both furnaces had 400 mm diameter openings without lids, resulting in high radiation and convection losses (16.35 kWh and 17.70 kWh per batch respectively).

Recommendation

The unit was advised to install lid mechanisms for each furnace to reduce heat losses.

Implemented Scenario

As advised, the unit installed lid mechanisms over the openings of both furnaces.

This investment of INR 5.6 lakhs is saving 189,836 kWh annually, equivalent to INR 16.2 lakhs. The simple payback period is 0.3 year.

Reduction of compressed air leakage

The unit was operating three air compressors. The leakages in the compressed air piping system were measured to be 24%. As advised, the unit arrested the leakages, bringing them down to about 5%. At no cost, this measure is saving 71,786 kWh annually, equivalent to INR 6.1 lakhs.

Optimizing air compressor operation

The unit's three air compressors were found to have different loading levels (73%, 37% and 60%). As advised, the unit optimized the load distribution among the compressors and arrested leakages to reduce the overall loading. At no cost, this measure is saving 39,054 kWh annually, equivalent to INR 3.3 lakhs.

Melting process optimization

Certain operating practices were found to be inefficient, leading to energy wastage: for instance, the rate of charging material into the furnace crucibles was very slow; excessive time was being taken for spectro-analysis; and slag removal was done after superheating. As advised, the unit reduced the time taken for charging materials and for spectro-analysis, and also removed slag before superheating. At no cost, these measures are saving 146,144 kWh annually, equivalent to INR 12.4 lakhs.

Replacement of cooling tower fan blades

As advised, the unit changed the cooling tower fan blades from aluminium to fibre-reinforced plastic (FRP). This investment of INR 0.2 lakh is saving 3114 kWh annually, equivalent to INR 0.3 lakh. The simple payback period is 0.9 year.

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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