MSME casting unit reduces energy bill and improves productivity through energy efficiency measures

Background

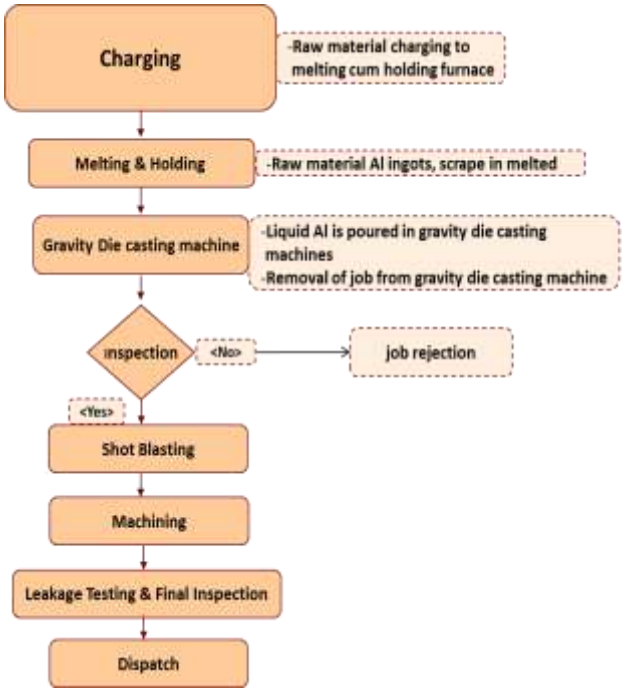
Pune, in Maharashtra, is a forging industry cluster. Large-scale units account for about 65–70% of the cluster's forging production, while MSMEs account for the remaining 30–35%. There are over 50 MSMEs producing forged components, with 20 heat treatment MSMEs functioning as their vendors. The production capacity of these units varies from 500 tonnes to over 3500 tonnes per annum (tpa).

Unit profile

M/s **P21** is an MSME unit that manufactures aluminium castings for components like housing, shock absorber casings for automobiles, fan blades and so on, producing about 344 tpa. The annual energy bill of the unit was INR 53 lakhs, which was around 15% of total turnover. The annual energy consumption was around 85 tonnes of oil equivalent (toe), of which liquefied petroleum gas (LPG) accounted for 88% (75 toe) and grid electricity 12% (10 toe).

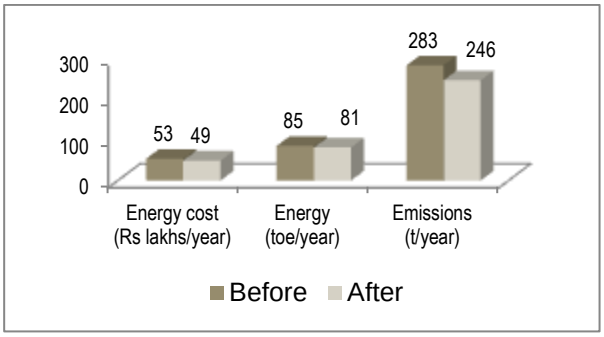
Process description

Aluminium ingots and scrap are charged into an LPG-fired melting furnace, from which the molten aluminium is drawn into an electrical melting-cum-holding furnace, and then poured into a gravity die casting machine to make the castings. The castings are then machined as per specifications to give the final products.



The major energy consuming equipments used were an LPG-fired melting furnace, an electrical holding furnace, electrical heat treatment furnace, and electrical motors associated with process equipment such as air compressor, pumps, etc.

Overall Impact: post-implementation



Overall Impact

8% reduction in total energy bill (i.e. annual savings of INR 4 lakhs) with a simple payback of 2 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 CO_2. This project is being co-implemented by Small Industries Development Bank of India (SIDBI) and Bureau of Energy Efficiency

INTERVENTIONS

Replacement of existing holding furnace with new holding furnace of higher rating and capacity

Baseline Scenario

The unit was operating an electrical crucible type holding furnace of capacity 300 kg/batch and rating 18 kW. This furnace showed high heat losses (about 12,900 kCal per hour).

Recommendation

The unit was advised to replace this furnace with a new electrical holding furnace of higher capacity and rating.

Implemented Scenario

As advised, the unit replaced its existing holding furnace with a new energy efficient furnace of 500kg/batch capacity and 25 kW rating.

This investment of INR 5 lakhs is saving about 23,600 kWh of electricity annually, equivalent to INR 2.1 lakhs, and has also increased productivity. The simple payback period is 2.4 years.

Relining of melting furnace to reduce heat losses

The unit was operating an LPG-fired melting furnace of capacity 400 kg per batch. The furnace refractory lining was damaged, leading to high surface heat losses (about 12,300 kCal per hour). As advised, the unit relined the furnace to minimize surface heat losses. This investment of INR 2.1 lakhs is saving an estimated 1942 kg of LPG annually, equivalent to INR 1.4 lakhs. The simple payback period is 1.3 years.

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.*

For further information please contact:

Energy Efficiency Centre, Small Industries Development Bank of India (SIDBI), Ground Floor, E-1, Videocon Tower, Jhandewalan Extension, Rani Jhansi Road, New Delhi-110055, India, Ph. 011 23682473-77, www.sidbi.in

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