

Replacement of inefficient FO-fired furnace with energy efficient FO-fired furnace with auto control system

Tags

Type: Unit case study

Sub-sector: Forging

Location: Pune

Partners: GEF, World Bank, SIDBI, BEE, TERI, Association of Indian Forging Industry (AIFI)

Year: 2012–14

Cluster background

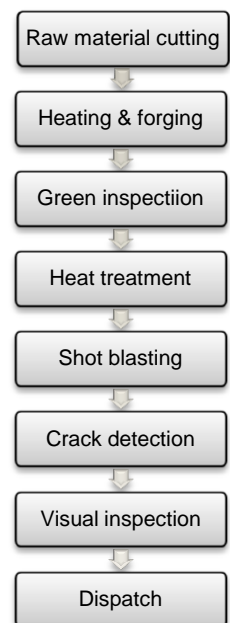
Pune (Maharashtra) is one of the important forging industry clusters located in India. There are more than 50 MSMEs in the cluster involved in the production of forged components, with 20 heat treatment MSMEs functioning as their vendors. The production capacity of MSME units is in the range of 500–3500 tonnes per annum (tpa). Large forging units account for about 65–70% of total production in the cluster, while MSMEs account for about 30–35%.

Unit profile

The MSME forging unit **P13** manufactures forged auto components like axles, gear blanks, connecting rods, flanges and valves. The average production of the unit is about 1248 tpa. The total annual energy bill of the unit was Rs 108 lakhs, which was around 10% of total turnover. The first step in the manufacturing process in the forging unit involves cutting of steel rods in the form of billets. The billets are heated in the furnace, forged with hammers and presses, trimmed, and subjected to heat treatment to give the final products.

Energy consumption

The main energy consuming equipment used in the unit were two furnace oil (FO)-fired forging furnaces, FO-fired heat treatment furnace, and electrical induction billet heater. Other equipment included hammer, press, air compressor, pump, and cooling tower. The annual energy consumption was around 144 tonnes of oil equivalent (toe), of which FO accounted for 51% (74 toe), grid electricity 48% (68 toe) and high speed diesel (HSD) 1% (1 toe).



Intervention

The unit was operating an FO-fired forging furnace of capacity 250 kg per hour, associated with 1 tonne hammer having a very low thermal efficiency level of 7.1%. The furnace operation required exhaustive maintenance. Heat losses due to improper combustion of fuel, flue gas losses and surfaces losses due to damaged and worn refractory of furnace walls were quite significant in the furnace. The specific energy consumption was estimated to be 202 litres of FO per tonne of job which is comparatively high.



L-Inefficient forging furnace; R - Energy efficient forging furnace with automatic control systems

The unit replaced its inefficient forging furnace with an energy efficient furnace equipped with automatic control systems

As recommended by the energy audit, the unit replaced the inefficient furnace with an energy efficient FO-fired furnace of the same capacity. The energy efficient furnace is provided with automated control systems for blower cut-off to reduce flue gas losses, and improved insulation to reduce surface losses. The specific energy consumption of the energy efficient furnace was 144 litres of FO per tonne. The annual energy saving is estimated to be 21,259 litres of FO. The energy cost saving is Rs 11 lakh per year. The investment requirement was Rs 3.4 lakhs towards the new FO fired furnace and associated auxiliaries, with a simple payback period of less than 4 months. The GHG reductions with installation of energy efficient furnace with auto control system are about 61.3 tonnes CO₂ per year.

