Application of veneering module in normalizing furnace

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 **P8** manufactures forged auto components like gear blanks and transmission parts. The average production of the unit is about 1500 tonnes annually. The total annual energy bill of the unit was Rs 343 lakhs, which was around 44% of turnover. The first step in the manufacturing process involves cutting of steel rods in the form of billets. The billets are heated in electrical induction furnaces, forged with hammers and presses, trimmed, and subjected to heat treatment in a normalizing furnace to give the final products.

Raw material cutting

Heating & forging

Green inspectiion

Heat treatment

Shot blasting

Crack detection

Visual inspection

Dispatch

Energy consumption

The main energy consuming equipment used in the unit were three electrical induction furnaces used for forging, and two normalizing furnaces: one electrical and the other fired by LPG. Other equipment included hammer, press, air compressor, pump, cooling tower, etc. The annual energy consumption was around 507 tonnes of oil equivalent (toe), of which grid electricity accounted for 60% (305 toe), LPG 28% (141 toe), and diesel 12% (61 toe).
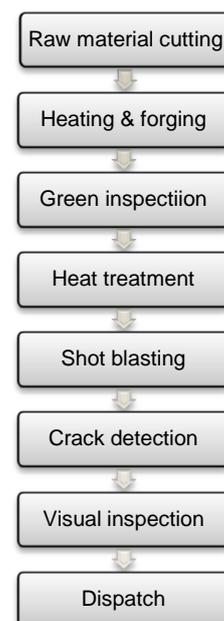
Intervention

The energy audit revealed that the LPG-fired normalizing furnace of 600 kg/hour capacity operated at low efficiency (below 10%) due to poor insulation. The surface heat losses were calculated at 36,139 kcal per hour.

> The unit undertook application of veneering module in its normalizing furnace

LPG-fired normalizing furnace: L- Before; R- After veneering

As recommended by the energy audit, the unit undertook the application of veneering module on the inside of the LPG-fired normalizing furnace, to reduce the surface heat losses and also store the residual heat during non-firing time. The energy saving with the application of veneering was 15.9 toe/year, equivalent to a monetary saving of Rs 10.6 lakhs. The application of veneering module required an investment of Rs 2.5 lakhs with a simple payback period of 0.2 years.The GHG reductions with veneering of the normalizing furnace are about 39 tonnes CO_2 per year.