Downsizing screw air compressor in a cast iron foundry unit

Tags

Type: Unit case study

Sub-sector: Foundry

Location: Kolhapur

Partners: GEF, World Bank, SIDBI, BEE, TERI, IIF–Kolhapur chapter, Kolhapur Engineering Association

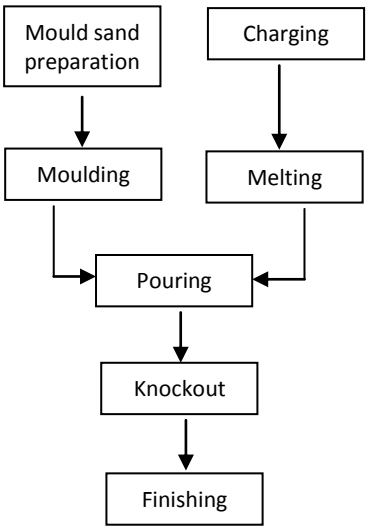
Year: 2012–14

Cluster background

Kolhapur (Maharashtra) is one of the important foundry clusters in India. The cluster has around 300 MSME foundries producing about 600,000 tonne of castings annually, primarily ferrous (iron) castings for the automotive sector, and 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

The MSME foundry unit **K9** manufactures graded cast iron (CI) and spheroidal graphite iron (SGI) castings. The annual production is about 2910 tonnes. The total annual energy bill of the unit was about Rs 236 lakhs, which was around 14% of total turnover. The major process steps involved in the production of castings include mould preparation, melting, pouring, knockout and finishing. Green sand is prepared using sand mixer and the moulding is done manually. The charge material is melted in an electrical induction furnace. The molten metal is poured into moulds, which are cooled down and knocked out manually to remove the castings. The castings are subjected to finishing operations such as shotblasting and machining. The sand from the moulds is sent for reuse in moulding process.



Production process in a foundry

Energy consumption

The major energy consuming equipment in the unit was electrical induction furnace. The other energy consuming equipment include air compressor, cooling tower, and pump. The annual energy consumption was around 319 tonnes of oil equivalent (toe) in the form of grid electricity.

Intervention

During the energy audit, it was observed that the capacity of the existing screw air compressor was larger than that required to meet the unit's needs. As a consequence, the unit was operating the air compressor in unloading condition for about 61% of the cycle, leading to energy losses. As per the recommendation of the energy audit, the unit the unit replaced its existing air compressor with a down-sized (lower capacity) energy efficient air compressor. The old compressor has been retained by the unit as standby.

L- Existing air compressor; R - downsized energy efficient air compressor

The unit replaced its existing air compressor with an energy efficient air compressor of lower capacity

The downsized energy efficient air compressor has reduced the annual electricity consumption by about 37,110 kWh. The investment of Rs 4.5 lakhs for the energy efficient air compressor is saving Rs2.6 lakhs annually. The simple payback period is 1.7 years. The estimated annual greenhouse gas (GHG) reductions are 33 tonnes of CO_2.