A FOUNDRY UNIT IN RAJKOT, RF003, IMPLEMENTS ENERGY CONSERVATION MEASURES

Tags	
Sub-sector:	Foundry
Location:	Rajkot
Partners:	SDC, TERI, Rajkot Engineering Association (REA)
Year:	2015

Background

The Rajkot engineering cluster has around 700 grey iron foundry units (about 10 large-scale, 50 medium-scale, and the remaining units in small & micro category). The cluster produces about 1500 tonnes of castings daily (about 0.46 million tonnes per annum) and provides direct employment to 30,000 people. The estimated annual turnover of the foundry cluster is about 4000 crore rupees. Under the TERI–SDC project titled 'Scaling-up Energy Efficiency in Small Enterprises (EESE), detailed energy audits (DEAs) were conducted on a number of foundry units in Rajkot to help identify energy conservation measures (ECMs) that could be adopted by the units. This case study summarizes how a foundry unit in the Rajkot foundry cluster has benefited by implementing some of the ECMs recommended by TERI.

Intervention

RF003 is a foundry unit set up in 2006, manufacturing grey iron and spheroidal graphite (SG) castings for auto components, elevators, textile machinery and engineering industry. The total production of the unit during 2014–15 was about 2832 tonnes; total energy consumption was 258 tonnes of oil equivalent (toe). Electricity is the main source of energy.

TERI conducted a DEA on the unit in January 2015, based on which it identified eight ECMs for implementation by the unit, which would reduce energy consumption by an estimated 21.7 toe annually and cut annual energy costs by about 25.2 lakh rupees. The unit has already implemented four of the ECMs, as summarized below. Implementation of some other ECMs is under way.

Investments, energy savings and other benefits

Improvement of power factor

The DEA found that the average power factor in the unit was 0.96, which is lower than the best possible power factor. While the unit had not yet been penalized for low power factor, it was losing out on the opportunity to get additional rebate from the

electricity utility by improving its power factor. Moreover, improving the power factor would also reduce the unit's overall demand. As recommended, the unit installed a capacitor bank of 320 kVAr capacity to improve the power factor to unity at the main incomer. Against an investment of one lakh rupees, this ECM is saving an estimated 4.3 lakh rupees annually on the electricity bill. The simple payback period is barely three months.

Increasing the contract demand to 1500 kVA

The DEA revealed that the unit's maximum electricity demand often exceeded the contract demand of 1200kVA. The excess demand was being billed at the penalty rate of 430 rupees per kVA. As recommended, the unit has increased its contract demand to 1500 kVA to avoid this penalty. The unit has also had to install a new transformer of rating 750 kVA for auxiliary to cater to the increased demand. This ECM required an investment of five lakh rupees, and is saving about 3.7 lakh rupees annually on the electricity bill. The simple payback period is 1.3 years.

Optimization of compressed air generation pressure

The unit uses one screw type air compressor to meet the compressed air requirements of pneumatic systems and for service air. The DEA found that the operating pressure of the air compressor was set at higher levels (7.8 bar unload, 7.0 load) than the 6.5 bar pressure required for various processes. As recommended, the unit has reset the operating pressure level to 7 bar. This no-cost measure is saving about 10,328 kWh of electricity annually (0.9 toe), equivalent to 0.7 lakh rupees.

Replacement of existing water pumps with energy efficient pump

The unit was using a soft water pump to circulate soft water for coil cooling of induction furnace; a raw water pump to circulate raw water to cool soft water; and a demineralized (DM) water pump to circulate DM water for panel cooling of the induction furnace. The DEA found that the efficiencies of these pumps were low, at 28.8%, 20.2% and 33.4% respectively. As recommended, the unit has replaced the existing pumps with an energy efficient pump at an investment of 1.8 lakh rupees. This ECM is saving 16,474kWh annually (1.4 toe), equivalent to a monetary saving of 1.13 lakh rupees. The simple payback period is 1.6 years.

(L) existing pump system; (R) energy efficient pump

ECMs implemented and estimated benefits

ECM	Annual energy saving		Cost saving	Investment	Payback
	Electricity (kWh)	toe	(Rs lakh/year)	(Rs lakh)	(years)
Improvement of power factor	–	–	4.3	1.0	0.2
Increasing the contract demand to 1500 kVA	–	–	3.7	5.0	Immediate
Optimization of compressed air generation pressure	10,328	0.9	0.7	–	Immediate
Replacement of existing water pumps with energy efficient pump	16,474	1.4	1.1	1.8	1.6
Total	**26,802**	**2.3**	**9.8**	**7.8**	