A FOUNDRY UNIT IN RAJKOT, RF008, 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

RF008 is a foundry unit set up in 2006. This unit produces steel castings for components such as industrial valves and pump bodies. The total liquid melting production of the unit during 2014–15 was 1182 tonnes; the dispatched production was 848 tonnes. The total energy consumption during 2014–15 was 148 tonnes of oil equivalent (toe). Electricity and liquefied petroleum gas (LPG) are the main sources of energy. TERI conducted a DEA on RF008 in April 2015, based on which it identified a total of 13 ECMs for implementation by the unit, with a potential to reduce annual energy consumption by 12.8 toe and save over 10 lakh rupees in annual energy costs. 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

Power factor improvement and maximum demand controller for melting plant

The average power factor recorded in the unit was 0.98 in both melting and fettling plants. This 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. Also,

improving the power factor would also reduce the unit's overall demand. As recommended, the unit has installed capacitor banks of 75 kVAr capacity for melting plant and 20 kVAr for fettling plant. This helps maintain unity power factor at the main incomer, and allows the unit to avail of rebates on power factor. Also, the unit has installed a demand controller at the main incomer of melting plant, to provide an alert when demand is about to shoot up, thus saving on excess demand charges. Against an overall investment of 0.75 lakh rupees, this ECM is saving about 1.02 lakh rupees annually on the electricity bill, giving a simple payback period of 0.7 years.

Arresting the air leakages in the compressed air system

The DEA found a high level of leakage (about 15%) in the plant's compressed air piping system. As recommended, the unit has reduced leakages to a nominal level of 5% by undertaking periodical checking for air leaks and arresting them. This no-cost ECM saves about 2568 kWh of electricity annually, equivalent to 0.16 lakh rupees.

Optimization of compressed air generation pressure for air compressor-1

The DEA revealed that the operating pressure of the air compressor-1 was set at higher levels (8 bar for unload to around 7 bar for load) than the required pressure for the processes (6.5 bar). As recommended, the unit has set the air pressure at 7 bar. This no-cost ECM is saving 4345 kWh annually, equivalent to 0.27 lakh rupees.

Optimization of compressed air generation pressure for air compressor-2

The DEA revealed that the operating pressure of the air compressor-2 (fettling) was set at higher levels (7.5 bar for unload to around 5 bar for load) than the required pressure (6.0 bar). As recommended, the unit has set the air pressure at 6.5 bar. This no-cost ECM saves 1729 kWh annually, equivalent to 0.11 lakh rupees.

ECMs implemented and estimated benefits

ECM	Annual energy saving		Cost saving	Investment	Payback
	kWh	toe	(Rs lakh/year)	(Rs lakh)	(years)
Improvement of power factor and maximum demand controller for melting plant	36	–	1.02	0.75	0.7
Arresting air leakages in compressed air system	2568	0.22	0.16	–	
Optimization of compressed air generation pressure: compressor 1	4345	0.37	0.27	–	Immediate
Optimization of compressed air generation pressure: compressor 2	1729	0.15	0.11	–	Immediate
Total		**0.74**	**1.56**	**0.75**	