A FOUNDRY UNIT IN RAJKOT, RF001, 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

RF001 is a foundry unit set up in 2003, manufacturing steel components like valves and pump bodies. The total production of the unit during calendar year 2014 was about 555 tonnes; the total energy consumption was 169.5 tonnes of oil equivalent (toe). Electricity and natural gas (NG) are the main sources of energy used.

TERI conducted a DEA on the unit in January 2015, based on which it identified nine ECMs for implementation by the unit, which would reduce energy consumption by an estimated 24.5 toe annually and cut annual energy costs by about 19 lakh rupees. The investment required was estimated at 20.6 lakh rupees, implying an overall simple payback period of just 1.1 years. 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 and installation of maximum demand controller

The average power factor recorded in the unit was 0.98, 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 180 kVAr capacity to improve the power factor to unity at the main incomer. The investment required was 30,000 rupees; the estimated annual saving on the electricity bill is 1.5 lakh rupees, implying a simple payback period of barely three months.

Arresting the air leakages in the compressed air distribution system

The unit uses three screw type air compressors of Kaesar make to meet its needs for compressed air. The DEA revealed very high levels of leakage (38%) in the existing compressed air piping system. As recommended, the unit has commenced periodical checking of the air piping system to detect and arrest leaks, thereby bringing down the leakage levels to about 5%. At virtually no cost, this measure is saving about 61,619 kWh of electricity annually, equivalent to 4.16 lakh rupees.

Optimization of compressed air generation pressure

The DEA revealed that the operating pressures of the three air compressors were set at higher levels for 'unload' (7 bar and above) than the 6.5 bar pressure required in the various processes. As recommended, the unit has reset the operating pressure levels in the compressors to 6.5 bar. This no-cost measure is saving about 15,096 kWh of electricity annually, equivalent to over one lakh rupees.

Installation of sequence controller for air compressors or installation of VFD for air compressor-2

The DEA revealed that energy was being wasted in keeping all the three air compressors on even when the plant's demands for compressed air fell to lower levels. The unit was advised either to install a sequence controller or a variable frequency drive (VFD) on air compressor 2, that switches the air compressors on or off based on the air demand in the plant. The plant has installed a sequence controller for the compressed air system. This measure is saving about 21,378 kWh of electricity annually, equivalent to 1.4 lakh rupees. The investment required was 2 lakh rupees, implying a simple payback period of 1.4 years.

(L) air compressor system; (R) with sequence controller

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 and installation of maximum demand controller	–	–	1.5	0.3	0.2
Arresting the air leakages in the compressed air distribution system	61,619	5.3	4.2	–	Immediate
Optimization of compressed air generation pressure	15,096	1.3	1.0	–	Immediate
Installation of sequence controller for compressed air system	21,378	1.8	1.4	2.0	1.4
Total	**98,093**	**8.4**	**8.1**	**2.3**	