CLUSTER PROFILE
NAGAUR HAND TOOLS INDUSTRIES

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Nagaur hand tools cluster

Cluster background

Nagaur, in the state of Rajasthan, is an important hand tools cluster in India. A wide range of hand tools are manufactured in the cluster. Separate units exist in the cluster to perform forging and finishing operations. Most of the forging units are concentrated in Basni industrial area, developed by RIICO and Rajasthan Finance Corporation (RFC). Other units such as machining, assembly, grinding and polishing are based at Loharpura area. Generally the products from forging units from Basni area are sent to other finishing operations at Loharpura. None of the units has facility to carry out both forging and machining operations together.

Cluster size and turnover

There are about 55 hand tool units in Nagaur cluster. In the recent past, several units were closed down due to poor market conditions. The turnover of the cluster is around Rs 35 crore (Rs 350 million). Pliers and hammers contribute for about 75% of the total production in the cluster. Other tools such as tin cutters, watchmaker and goldsmith tools are made in cottage industries in Loharpura area. Most of the units are selling their produce in the domestic markets and none of the units are exporting their product directly. Few units cater to the needs of Jalandhar hand tools cluster, who in turn do export. Table below shows the distribution of industrial units in the cluster. The cluster provides employment to more than 2,000 skilled and non-skilled workers.

Distribution of production in Nagaur cluster

S. No	Type of industry	Units
1	Forging	41
2	Machining	14
	Total	55

Industry associations

There are two industry associations in the cluster – (1) Nagaur Hand tools Manufacturers Association (NHMA) and (2) Nagaur Hand tools Traders Association (NHTA). The NHMA comprises mainly entrepreneurs from Basni road. Both the associations are not registered. A large numbers of artisans situated in Loharpura are not part of any of these associations.

There is a Hand Tool Design Development and Training Centre at Nagaur, set up in 1988 with the objective to develop small and tiny units in the area. Very few units avail the services of the Centre and most of the small artisans are unaware of the existence of the centre.

Technology status and energy use

Two distinct operations take place Nagaur hand tools sector. This includes forging and other finishing operations. Forging includes (1) Drop forging, (2) Spring forging and (3) Hand forging. The forging units are using drop hammer in case they manufacture full forging pliers and/ or hammers of more than 750 grams. In case the units have installed drop

hammer they also manufacture half forging pliers and low weight hammers. The drop hammers are generally purchased second hand from the Ludhiana or Ajmer. Spring hammers are mostly used for manufacturing half forging pliers and / or less than 750 grams hammers. The spring hammer is connected with belt and shaft arrangement. The spring hammer continuously hammers, whereas, the drop hammer is pulled once the job is placed. The artisans carry out hand forging using the traditional technology i.e. anvil and hammer. Traditional techniques are used for heat treatment i.e. heat the material and quenching it in water. Most of the time, heating is done in the furnaces but in case of pliers, the treatment is carried out using oxy-acetylene flame.

The finishing operations carried out in Loharpura cluster include machining, assembly, grinding and polishing operations. These units have lathe machines and drill machines. The machining units use shaft arrangement fitted with belt for running various machines.

Forging units generally operate for 6 hours a day (8 am to 2 pm) and the machining operations for 8 hours (from 8 am to 4 pm). Production from a unit depends on the number of hammers installed in each unit and the market demand. These units operate for 23–25 days in a month. It is estimated that the cluster produces about 4,200 tonnes of hand tools per annum. Major raw material used by the forging units is rectangular iron bar of En-8 specifications of size 12–15 mm. The raw material is procured in bulk from Mandi Gobindgarh (Punjab) and also from local traders.

There are no proper records pertaining to the yield and rejections. Estimates show the average rejection from a unit is 4–5%. The common defects in a forging unit include cracks ignored in raw material, forging cracks and unmatched surface. Oil fired furnaces are used in forging units in the cluster. The machining units use electricity for various finishing operations. Grinding and finishing operations are carried out in belt polishing machines. The energy usage in Nagaur hand tool cluster is estimated to be 1,183 toe per year as shown in the table below.

Energy consumption in Nagaur hand tools cluster

Energy form	Energy consumption per year		
Fuel	Quantity	toe /yr	Share
Furnace oil	1,200,000 lit	1,020	86%
Electricity	1.9 million kWh	163	14%
Total		1,183	100%

Energy and environmental performance

The SEC of various hand tools unit varies between 12.3–14.7 GJ/tonne (0.294-0.351 toe/tonne). The performance of the cluster calculated in terms of specific energy consumption (SEC) and the emission intensity (EI) are given in table below.

Performance of Thangarh ceramic cluster

Total energy consumption	1,183 toe per year
Specific energy consumption	0.279 GJ/tonne
Total CO_2 generation	0.005 million tonne
Emission intensity	1.1 t CO_2/ t product

Options to enhance energy efficiency

(i) Redesigning of forging furnaces

Furnace accounts for majority of the energy consumption in a forging unit. These furnaces are locally made using clay brick and mud. Locally manufactured burners are used for oil firing. The insulation used in the furnaces is also poor. There is no monitoring and control system available for the furnace operation. There is significant scope for improving the energy efficiencies of the forging furnaces. Various options include use of waste heat recovery systems for preheating combustion air, better insulation, use of appropriate burner system to improve the combustion efficiency and monitoring and control system for optimum performance. The envisaged energy saving is about 30% in forging furnaces.

(ii) Improvements in auxiliary electrical systems of forging furnaces

Various energy saving options such as optimum sizing of motors, better damper control system and use of waste heat for oil preheating in place of electrical heating would help in an energy saving of about 10%.

(iii) Energy conservation options in machining operations

The energy conservation options identified in machining operations include advance control like AC hybrid electric clutch and optimizing motor sizing in various finishing operations. Envisaged energy saving in machining operations is about 15%.

Table below summaries the total energy saving and CO_2 reduction potential in the cluster.

Energy saving and CO_2 reduction potential

Total energy saving potential	1,183 toe/yr
Total CO_2 reduction potential	0.001 million tonne

References

- Visits of TERI team in the cluster (Dec 2010)