

CLUSTER PROFILE

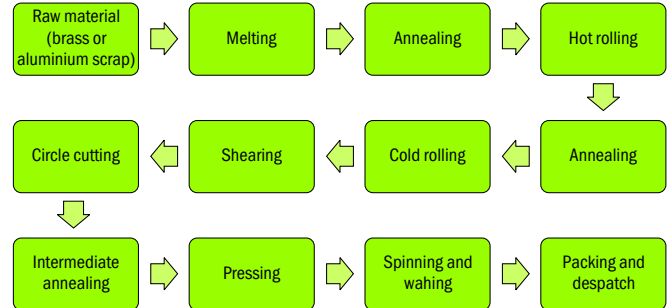
JAGADHRI BRASS AND ALUMINIUM CLUSTER

Background

Jagadhri is an important industrial town located in Yamuna Nagar district of Haryana. A number of large-scale industries are located in this town, such as the Northern Railway Workshop, paper mills, plywood and board factories, and sugar mills. Jagadhri is also renowned for its brass and aluminium ware, which are manufactured by about 175 MSME units in the cluster. The brass units manufacture utensils, sheets, coils and strips; the aluminium units mainly produce utensils. The brass sheets, coils and strips are sold to appliance manufacturers, and the brass/aluminium utensils are sold throughout India through a network of dealers. The Jagadhri cluster produces an estimated 67,200 tonnes of brass and aluminium products each year. The cluster has two associations, ‘Jagadhri Metal Manufacturers & Suppliers Association’ and ‘Small Scale Aluminum Utensils Manufacturers Association’, which help them in tackling issues related to technology, finance, policy and manpower.

Technology status and energy use

The primary raw materials for brass units are copper, zinc and brass scrap, while for aluminium units it is aluminium scrap (secondary aluminium). The raw materials are mixed in the required proportions, melted down in a furnace and poured into castings of required size and shape, which are then subjected to annealing (heat treatment), acid washing, hot and cold rolling, shearing and pressing to give the finished products. The brass units



Manufacturing process (brass and aluminium units)

mainly use coke-fired ‘pit furnaces’ for melting; some units use electrical induction furnaces. The aluminium units commonly use oil-fired pit furnaces for melting. Three types of annealing furnaces are employed in the cluster: electrical, wood-fired or oil-fired.

Thermal energy accounts for a major share of energy consumption in the brass and aluminium units (94%). The major fuels used in the cluster are imported coke, furnace oil and wood. Electricity is used for operating the induction furnaces and hot & cold rolling machines. The

Annual energy consumption in Jagadhri brass and aluminium cluster

Energy source	Tonnes of oil equivalent (toe)	Energy share (%)
Thermal	34606	94
Electricity	2150	6
	36756	100

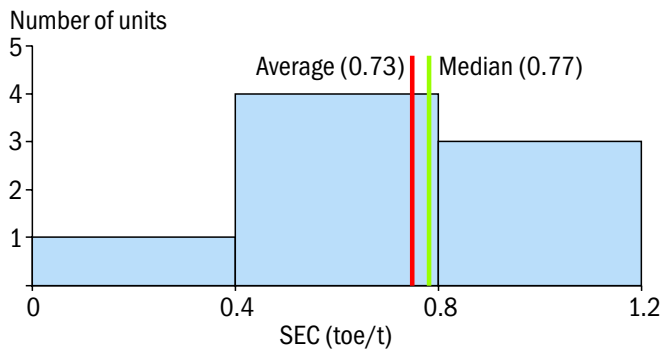
Profile of units in Jagadhri brass and aluminium cluster

Type	No. of units	Capacity range (tpa)*	Total production (tpa)
Brass	100	180–600	31200
Aluminium	75	240–960	36000
Total	175		67200

* tpa—tonnes per annum



Coke-fired pit furnace for brass melting



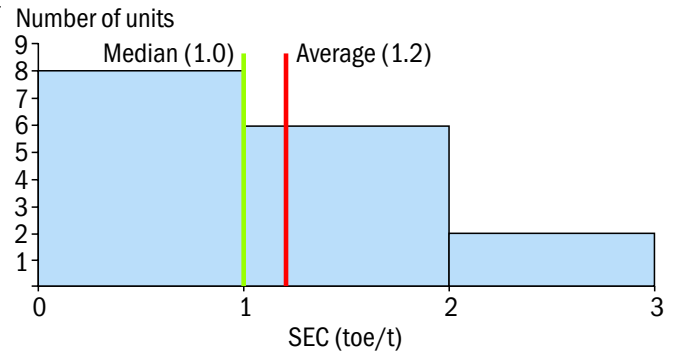
Distribution of SEC in brass units—Jagadhri cluster

total annual energy consumption of the Jagadhri cluster is estimated at around 37000 tonnes of oil equivalent (toe).

The graphics indicate the energy efficiency levels that can be achieved by other low-performing units.

Options for energy saving

Energy audits were conducted on a total of 26 units in the cluster covering both brass and aluminium units. The specific energy consumption (SEC) of the brass units was found to range from 0.4 toe/t to 1.2 toe/t, while the SEC of aluminium units ranged from 1.0 toe/t to 3.0 toe/t. A large



Distribution of SEC in aluminium units—Jagadhri cluster

number of units exhibited higher energy consumption as compared to the average SEC levels in both type of units, indicating significant potential for improving the energy efficiency. The total annual energy saving potential for the cluster is estimated at around 7900 toe, which is about 21% of the total estimated energy consumption of the cluster. The investment requirements are Rs 336 million towards technology upgradation and modernization with the simple payback period ranging from 2 months to 3.5 years. The different energy conservation options along with their potential energy saving are summarized below:

Options for energy efficiency			
Energy efficiency option	Replication potential (units)	Annual energy saving potential (toe)	Total investments (Rs million)
<i>Coke-fired pit furnace</i>			
• Wood gasifier	50	1151	75.0
• Waste heat recovery	25	97	0.8
• Energy efficient pit furnace	50	196	1.5
• Induction furnace for melting	30	865	55.8
Sub-total (i)		2309	133.1
<i>Oil-fired pit furnace</i>			
• Wood gasifier	50	1751	75.0
• Waste heat recovery	25	151	0.8
Sub-total (ii)		1902	75.8
<i>Wood-fired annealing furnace</i>			
• Wood gasifier	75	1443	60.0
• Thermocouples	150	1443	7.5
• Modified annealing furnace	100	845	60.0
Sub-total (iii)		3731	127.5
Total (i) + (ii) + (iii)		7942	336.4

Compiled by TERI from (i) 'Manual on energy conservation measures in brass and aluminium cluster, Jagadhri' under the BEE-SME Programme, 2010; (ii) 'Benchmarking and mapping Indian MSMEs energy consumption': a BEE-AfD-TERI study, 2012