

Replacement of manual jigger with double roller head automatic jigger in a ceramic unit

Tags

Type: Unit case study

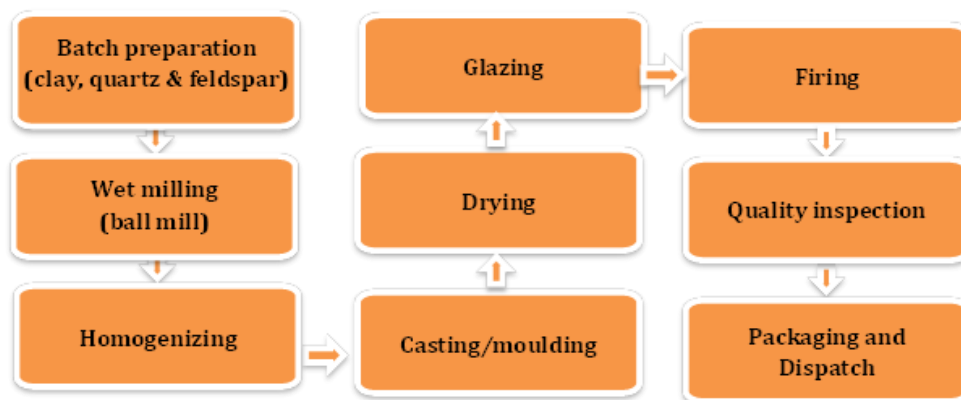
Sub-sector: Ceramic

Location: Khurja

Partners: Self effort of the unit

Cluster background

The Khurja ceramic cluster is one of the oldest ceramic clusters in India, located in Bulandshahr district, Uttar Pradesh. More than 200 units are engaged in manufacturing of various ceramic products like crockery, table ware, decorative ware, porcelain insulators, special ceramics, toys and non-china crockery products. Due to environmental regulations, the units had shifted over from coal-fired downdraft (DD) kilns to mainly oil/gas-fired tunnel kilns. Some units also operate oil-fired shuttle kilns for producing special ceramic products.



Unit profile

The unit manufactures ceramic cups of different shapes and colours using a wide range of raw material combinations. The average production of the unit is estimated to be 20,000 pieces per day. The manufacturing process mainly consists of mould preparation, body material preparation, shaping, drying

and firing. Both electrical and thermal energy are required at different stages of the process such as operation of ball mill, moulding, kilns, cutting & finishing machines, and utilities such as motors, pumps air compressor, etc. Thermal energy consumed in the kiln accounted for a major share (about 90%) of total energy consumption. Each year the unit consumed 176,400 kWh of electricity, 50 kilo litres of fuel oil (FO), and 12000 litres of HSD. The annual energy consumption of the unit was estimated to be 74 tonnes of oil equivalent (toe), equivalent to 48.5 lakh rupees. The equivalent greenhouse gas (GHG) emissions from the unit were estimated to be 319 tonnes CO₂ per year.

Intervention

The unit was using manual (i.e. non-automatic) jigger machines to produce green ceramic products. The average production from a non-automatic jigger machine was estimated to be 6,000 pieces per day with specific energy consumption (SEC) of 1.83 kWh per thousand pieces. The non-automatic system and human operation led to inconsistency in green moulding. The average yield of green products from manual jigger machine was about 85% and the final yield after firing was about 90%.

Based on production, the unit replaced four manual jigger machines with three automatic double head jigger machines. With this, the unit not only reduced its energy consumption but also enhanced monetary gains due to higher revenue from better yield and premium quality products. The production capacity of the automatic double head jigger is about 8,000 pieces, of consistent product quality and 95% yield. With improvement in green product quality, the yield after firing had increased from 90% to 98%. The SEC of ceramic products has been reduced from 1.83 kWh to 1.13 kWh per thousand pieces with an estimated energy saving of about 38%.

The unit replaced manual jigger machines with automatic double header jigger machines



Manual jigger machine



Automatic double head jigger machine

The monetary saving from replacement of manual jigger machines with automatic double head jigger machines is Rs 19 lakhs per year, covering both energy saving and additional revenue due to improved yield. The investment for automatic double head jigger machines was Rs 23 lakhs with a simple payback period of 1.2 years. The estimated annual energy saving is 3,600 kWh, equivalent to a reduction in GHG emissions of 3 tonnes CO₂ per year.

