



BENGAL FINE CERAMICS LIMITED

Washing Raw Materials in Cascade Tanks Instead of Using a Hose

SUMMARY OF THE OPTION

Bengal Fine Ceramics Ltd (BFCL) is a medium size producer of ceramic tableware located at Bhagalpur, near Dhaka, Bangladesh. Raw materials were washed on the ground with a hose before the crushing stage. This caused high water consumption, significant amounts of wastewater, and high loss of raw materials through the wastewater stream. To prevent this wastage, it was recommended to install a new washing system that consists of three tanks. Water flows from the first, to the second, to the third tank. Raw materials are washed in opposite direction: in the third, then in the second, and then in the first tank.

Investment costs were US\$ 1667, annual savings are US\$ 2819 and the payback period is 7 months. A significant amount of water is saved (though not quantified because water is not paid for) and wastewater quantity is reduced and quality is improved. Approximately 1.65 tons of raw materials are saved each year. Although this is primarily a water reduction option, electricity for pumping water from the ground is reduced with 990 kW per year, resulting in 0.5 tons of CO₂ emission reductions. The option was being implemented at time of writing of this case study.

KEYWORDS

Ceramics, Bangladesh, Pumps and pumping systems, Water, Wastewater recovery

OBSERVATIONS

Water use and wastewater disposal are main issues for this plant because a lot of water is used for washing of raw materials, and a lot of wastewater is generated with high concentrations of raw materials. The following observations were made of the washing of raw materials:

- Before the crushing process, raw materials are washed with a hose spraying over the raw materials
- Water consumption for the washing process is very high
- Wastewater used for washing is discharged without recovery of raw materials remnants, water recycling or wastewater treatment
- Substantial amounts of raw material is lost through the wastewater stream
- A 20 HP motor is using in the pump house to supply water for the washing process
- Excess water consumption and large amount of wastewater generation

OPTIONS

A considerable amount of water and raw materials could be recovered by separating solids from the wastewater and subsequently reuse the water in the washing process.

A cascade system was proposed as shown in the figure below. Raw materials are washed in tank 3, are then transferred to tank 2 and then tank 1. Freshwater flows in the opposite direction from tank 1



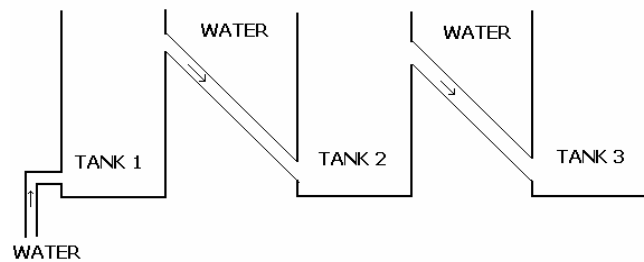
to 3. In other words, raw materials are washed in the least clean water first (tank 3) and in clean water last (tank 1). The benefits of this system are as follows:

- Cleaning of raw materials is improved
- Water consumption is reduced
- Raw material consumption is reduced because small size raw materials are deposited on the bottom of the tank and can be collected for use
- Wastewater quantities are reduced and wastewater quality is improved

The previous and new system are shown below:



Existing Raw material washing practice



Proposed Raw material washing suggestion

RESULTS

The option was being implemented at time of writing of this case study, and therefore investment costs are known but other results are expected calculated results.

Financial Benefits:

- Investment: US\$ 1667 for the construction of the washing bath (TK 100,000)
- Annual operating costs: none
- Annual cost savings: US\$ 2819 (TK 169,158)
 - From Bore well operation = 3 kW/day X 330 days/yr X TK 4.20/kWh = TK 4,158
 - From Raw material saving: 5kg/day X 330 days/yr X TK 100/kg= TK 165,000
 - From water consumption: no cost savings because water is not paid for
- Payback period: 7 months

Environmental Benefits:

- Annual electricity savings: 990 kWh (= 3 kW X 330 days/year)
- Annual GHG emission reductions: 0.53 tons CO₂ (= 0.990 MWh X 0.54 t CO₂/MWh, based on emission factor for electricity generation in Bangladesh taken from the UNEP GHG Indicator, www.unep.org/energy/tools)
- Reduced water consumption: not quantified
- Reduced water pollution (dissolved solids): not quantified
- Annual reduced raw material consumption: 1.65 tons

Other Benefits:

- The company now better meets environmental requirements of its international customers.



FOR MORE INFORMATION

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