



## BENGAL FINE CERAMICS LIMITED

### Heat Recovery from Furnace Exhaust for Reuse in Dryer

#### SUMMARY OF THE OPTION

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Bengal Fine Ceramics Ltd (BFCL) is a medium size producer of ceramic tableware located at Bhagalpur, near Dhaka, Bangladesh. Exhaust heat from kilns is partially used for the drying of green ware but the majority is discharged into the atmosphere, resulting in significant heat losses. As the temperature of the vented exhaust is high the company decided to install a pipeline to recover exhaust heat from one of the kilns and use this heat in a newly installed dryer at the green ware drying process.

Investment costs were US\$ 833, annual savings were US\$ 1874 and the payback period is 5 months. Natural gas savings for the dryer are 19,800 Nm<sup>3</sup> per year, which is equivalent to 43 tons of CO<sub>2</sub> emission reductions.

When the company installs a full heat recovery system, several of the burners of the green ware dryer could be taken out of operation, resulting in significantly higher savings of natural gas and costs. High investment and the need to shutdown the production process are current barriers for this option.

#### KEYWORDS

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Ceramics, Bangladesh, Furnaces and refractories, Waste heat recovery, Dryer, Pipelines

#### OBSERVATIONS

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There are four furnaces or kilns in the plant: Glost Kiln, Biscuit kiln, Decoration kiln and Shuttle kiln. The following observations were made during the assessment of the kilns:

- Part of the exhaust heat is used in the preheating zone of the glost furnace and as make-up of the green ware drying line. The additional heat requires for the green ware drying is generated by 12 gas burners.
- The other three furnaces also have exhaust recirculation systems at the preheating sections of the kilns plus exhaust stack lines.
- The glost kiln and biscuit kiln are close to the green ware drying zone and other two kilns are further away. The shuttle kiln is operated in batch process.
- Most of the remaining heat from the exhausts is dispersed into open air
- Hot air primary or heat recovery sources is supplied through pipelines to the green ware drier
- The temperatures at the exhaust stacks were very high: 250<sup>0</sup>C at glost kiln stack and 178<sup>0</sup>C at the biscuit kiln stack
- There is major temperature difference at the source (120<sup>0</sup>C) and supply point (90<sup>0</sup>C) of the pipeline

#### OPTIONS

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Considering the above observations, it was recommended that the entire exhaust from the Glost kiln and Biscuit kiln should be channelled to the hot air supply pipeline. Plant management adopted the Team's suggested and re-arranged pipelines to recover heat from the exhaust pipeline of the Biscuit Kiln and using this heat in the newly installed dryer at the green ware drying process, thus saving consumption of about 5 Nm<sup>3</sup>/hour natural gas and as well as heat loss.

However, if the company would install a complete heat recovery system as per the Team's suggestion, they can minimize the heat loss and take several gas burners out of operation.

It was not possible to implement this option fully by the time of writing of this case study because this requires:

- High investment
- More complex technology (which takes time to investigate)
- The plant to be shut down for installation of a heat recovery system. With the current busy production schedule this is not possible.

## **RESULTS**

Results of the re-arrangement of pipelines to recover heat are as follows:

### **Financial Benefits:**

- Investment: US\$ 833 (TK 50,000)
- Annual operating costs: almost none
- Annual cost savings: US\$ 1874 (=5 NM<sup>3</sup>/hr X 24 hr/day X 330 day/annum = 19,800 Nm<sup>3</sup> X Tk 5.68/Nm<sup>3</sup> = Tk 112,446)
- Payback period: 5 months

### **Environmental Benefits:**

- Annual natural gas savings: 19,800 Nm<sup>3</sup> = 7.24 K.Therm
- Annual GHG emission reductions: 43 tons CO<sub>2</sub> (= 7.24 k.Therm X 5.919 tCO<sub>2</sub>/K.Therm, using emission factor from the UNEP GHG Indicator, [www.uneptie.org/energy/tools](http://www.uneptie.org/energy/tools))

### **Other Benefits:**

- Improved working conditions because the temperature inside the factory is reduced

## **FOR MORE INFORMATION**

### ***GERIAP National Focal Point of Bangladesh***

Mr. M Saidul Haq, President  
Institute for Management Consultants Bangladesh (IMCB)  
396 New Eskaton Road  
Dhaka 1000, Bangladesh  
Tel: +880-2-9353350-4, 9351102  
Fax: +880-2-9351103  
E-mail: [srgb@consultant.com](mailto:srgb@consultant.com)  
Web: [www.srgb.org](http://www.srgb.org)

### ***GERIAP Company in Bangladesh***

Enamul Wadud Khan, Director Production  
Bengal Fine Ceramics Ltd  
H H Bhaban (2<sup>nd</sup> & 3<sup>rd</sup> Floor)



**BENGAL FINE CERAMICS LTD: Heat recovery from furnace**

52/1 New Eskaton Road  
Dhaka 1000, Bangladesh  
Tel: +880-2-9345174, 9356085  
Fax: +880-2-8314933  
E-mail: [bfcl@dbn-bd.net](mailto:bfcl@dbn-bd.net)  
Web: [www.bfcl.net](http://www.bfcl.net)

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