LANKA TILES LIMITED

Use of Waste Heat from Kiln for Chambered Tile Drying

SUMMARY OF THE OPTION

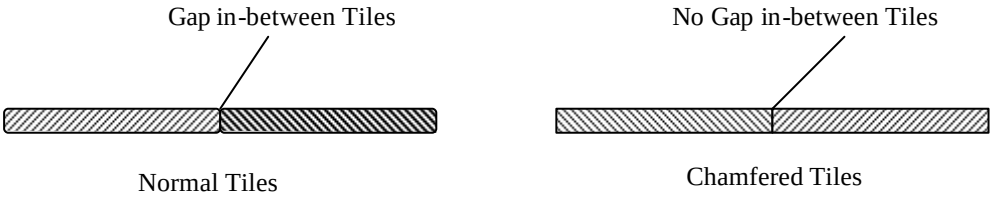
Lanka Tiles is a ceramic-based floor tile manufacturing company in Sri Lanka. There is an increased demand for chamfered tiles in Sri Lanka. During the manufacturing process, chamfered tiles are sprayed with water to avoid damage to the tiles and the grinding wheel. The water that is absorbed into the tiles is removed by conveying tiles through a hot tunnel that uses kerosene. To minimize fuel consumption, the company decided to recover waste heat from kiln number 3 and use this to dry the tiles. The investment costs are US$ 60,000 and expected financial savings are US$ 12,250 per year through the reduction of 49,000 liters of kerosene. The expected payback period is five years, which will be further reduced with increasing fuel cost due to the rising oil prices. GHG emission reductions will be 126 tons CO_2 per year. An additional benefit of this option are improved working environment because lower temperatures at kiln and less kerosene odors.

KEYWORDS

Ceramics, Sri Lanka, Waste Heat Recovery, Tiles, Drying, Kiln

OBSERVATIONS

The geometrical dimensions of the ceramic floor tiles are not exactly the same for each tile. For this reason it is a normal practice to fill the minor gaps in between adjacent tiles with a cement filling material (grouting cement) during the paving process.



Chamfered tiles are produced to avoid the need for cement filling material. There is an increased demand for these tiles and they are normally sold at a higher price and therefore Lanka Tiles installed a tile chamfering line. During the chamfering process, the four edges of these tiles are ground with a diamond grinding wheel. During this process tiles are covered with water to avoid overheating of the tiles that could damage them and to protect the grinding wheel. As a result some water is absorbed into the tiles, but this can affect the visual quality of tiles due to growth of fungus and for other reasons. To remove absorbed water the wet tiles are conveyed through a hot tunnel, which costs energy, either gas or kerosene.

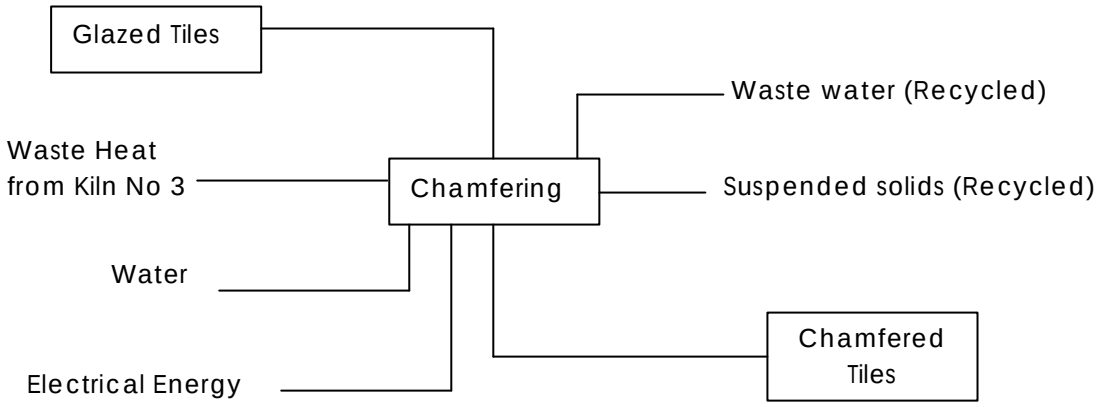
OPTIONS

Several options were generated and some examples include:

- Installation of a gas fired short tunnel kiln
- Avoid the dimensional variation of tiles
- Use of waste heat in drying wet tiles instead of gas or kerosene
- Use of solar heat in drying the wet tiles

The above options were discussed in length. Finally it was decided to recover the waste heat from kiln number 3 and feed it into the drying chamber for tile drying purposes as shown in the figure below. Avoiding the dimensional variations during the manufacturing process was the best Cleaner Production option because it would reduce waste at its source, but the option was dismissed for technical and economical reasons.

In combination with the option a water saving option was also implemented. During the tile chamfering process, a small amount of solid material is added to the cooling water. As a water saving measure, the suspended solids are separated and reused as new tile body material and water is recycled.



RESULTS

To recovery heat from kiln number 3 requires long air ducting lines between the kiln and the chamfering line. At time of writing of the case study, the construction of the ducting was in its final stage. For this reason the benefits given below are expected benefits only.

Financial benefits (expected):

- Investment: US$ 60,000
- Annual cost savings: US$ 12,250 (49,000 liters kerosene X US$ 0.25/ liter)
- Payback period: 5 years (this will be further reduced with increasing fuel cost)

Environmental benefits (expected):

- Annual kerosene savings: 49,000 liters
- Annual GHG emission reduction = 126 ton CO_2/year

Other benefits (expected):

- Improved working environment because lower temperatures at kiln and less kerosene odors

FOR MORE INFORMATION

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