



**Title: Cullet preheating device for application of the unused heat**

### **1) Introduction**

The ceramics industry, which includes the glass industry, is the fourth largest producer of emissions in the entire Japanese industry. Though it appears to be contributing to the energy saving, it is still necessary to save more energy and reduce greenhouse gas emissions on a global scale.

Glass melting furnace is the most energy-consuming area of the whole glass manufacturing process, with its energy consumption accounting for 60~80%. At present, such technologies as air preheating, oxygen enrichment and oxygen combustion, as well as electric enhancing, all-electric melting and raw material preheating seem to be perspective in terms of energy saving.

### **2) Research objective**

Among the above-mentioned energy-saving solutions, only air preheating and raw material preheating can actually re-use the exhaust heat from the glass melting furnace. Among these, the preheating of raw material uses low-temperature exhaust gas of 500°C or less, which allows to save the energy.

### **3) Task**

At IFC we have studied a device which only preheats the cullet. The reason why the batch is not preheated is that if the batches are heated together, they solidify and might clog the device. Also, when the dried batch enters the glass furnace, it scatters around and provokes the erosion of the bricks. As a result, the life of the furnaces becomes shorter.

If we only preheat the cullet, there is no risk of malfunction due to clogging of the device as well as no concern about scattering of the fine powder of the raw material.



#### 4) Distinctive features

The cullet preheating device developed by IFC is a hybrid structure divided into two heating zones – indirect and direct. First, in the indirect heating zone the moisture contained in the cullet is being removed. The reason why the moist cullet and the exhaust gas should not come into direct contact is that the moisture reacts with the gas, causing the metal corrosion of the equipment. The direct heating zone effectively heats up the dehydrated cullet.

#### 5) Summary

By pre-heating the raw material before putting them inside the melting furnace, the amount of fossil fuel energy used for the melting process can be reduced, and, as a result, the amount of greenhouse gas emissions can also be minimized.