



Slag & Refractories

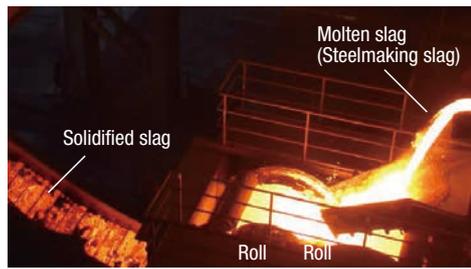
In steel manufacturing, inorganic materials have important role in the process. Slag & Refractories Research Department is developing; 1) effective utilization of ferrous slag which is an oxides by-product from steel manufacturing process, and 2) refractory technology to elongate lining life and save process energy.

Process Innovation of Slag Production

Steel slag needs improving quality to utilize it in new application fields. Various "only-1" slag solidification processes have been developed and applied in plant scale. The manufactured slag with improved properties can be utilized as another application such as concrete aggregate.



Pan type continuous slag solidification process for concrete aggregate: PACSS™



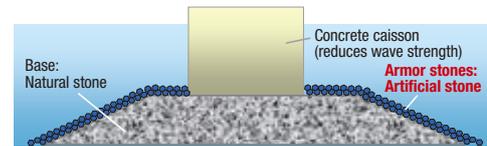
Twin roll type continuous slag solidification process for heat recovery (COURSE50)

Artificial Stone made of Steel Slag

Ironmaking slag has hydration hardening property similar to cement, and steelmaking slag has high density and hardness. Taking these advantages, large artificial stones have been successfully developed from steel slag. Large stones are suitable for submarine structure and they are contributing to reconstruction after the Great East Japan Earthquake and Tsunami.



Artificial stones used in disaster recovery in Tohoku area (1 ton size)



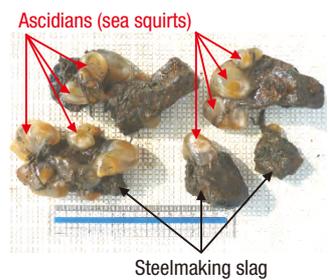
Application site of artificial stone within submarine structure

Restoration of Coastal Environment using Steelmaking Slag

In Japan, coastal environment has not been fully recovered yet and sediment causes in poor oxygen condition in an inner bay. Steelmaking slag detoxifies hydrogen sulfide and improves environments under the sediment. The slag also has an excellent bio-affinity property, which helps to restore marine ecosystem.



Steelmaking slag with adjusted particle size



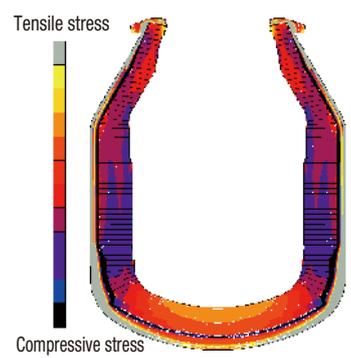
Macro benthos adhering to slag in demonstration test area of Fukuyama inner harbor

Development of Application Technologies for Refractories

Refractories are necessary for the ironmaking and steelmaking vessel to endure molten steel at high temperature. They are designed respectively depending on the process such as blast furnace, torpedo car, hot-metal ladle, converter and so on. We are developing new materials with excellent durability, and also studying advanced thermal stress calculation for the optimum brick lining structure.



330t converter



Stress distribution of refractories in converter