

Development of New Boronated Aluminum for Basket Assembly of Transportable Storage Cask

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Mitsubishi Heavy Industries, Ltd. (MHI) has developed a transportable storage cask design, the "MSF series". The MSF series transportable storage cask uses newly developed boronated aluminum as basket material. This boronated aluminum has proven to be a reliable material in the production of the basket. This boronated material has the following features:

-- Non-aging material

Aging treatment is often applied to reinforce an aluminum alloy. However, the strength of aged aluminum alloy deteriorates when it remains in a high temperature condition. Therefore, it is necessary to estimate the structural integrity of basket based on the predicted strength of the aluminum, which is difficult to do. The newly developed boronated aluminum does not require aging treatment.

-- Homogeneity of boron dispersion

The standard manufacturing process of boronated aluminum alloy (shielding plate) is to dissolve boron in molten aluminum. However, if too much boron is added into molten aluminum, the boron compound separates, ingots form that either rise to surface or sink to the bottom. Therefore, it is difficult to produce a boronated aluminum alloy in which the boron content is homogeneous by using the ingot making method.

To solve the above problems, a powder metallurgy technique has been adopted to manufacture boronated aluminum. The manufacturing process of newly developed aluminum does not use the molten aluminum process and provides homogeneity of boron dispersion throughout boronated aluminum.

-- High stiffness/toughness

There is a tendency for standard boronated material to be brittle because large precipitations are deposited in molten metal during the manufacturing process. The powder metallurgy technique has solved this problem.