

Ceramic Casting



A.) Principles of the ceramic mold.

The ceramic mold process is a method of mold making and precision casting using conventional patterns with no size restrictions.

The ceramic mold is unique among casting techniques because of the principle of fine micro crazing developed in the mold. Characteristics of the ceramic mold are extremely accurate reproduction of pattern detail, smooth surface finish, exceptional dimensional stability and resistance to thermal shock. This resistance to thermal shock enables large masses of molten metal to be poured into cold molds without any spalling, washing, or cracking due to the thermal effect. Extreme accuracy of both mold and casting are obtained from smooth accurate patterns, and furthermore there is no shrinkage or distortion in the mold when done in the proper manner.



B.) The ceramic mold structure.

The basis for the ceramic mold is the unique structure of the mold which depends on a carefully controlled gelling process, initiated by the addition of a gelling reagent to a liquid binder. This binder is comprised of a colloidal suspension of silica in alcohol which has been produced by controlled hydrolysis of an organic or inorganic silicate. Finely powered refractory materials are added to the liquid binder to form a mobile slurry which is poured over a pattern. As gelling progresses, the slurry solidifies and passes into a tough rubber-like phase. Then stripping in the hard rubber phase and ignition produces the microcrazing which is the most important aspect of the ceramic mold.



C.) Microcrazing.

The mold consists of a silica gel which is suspended with various small sized elements of refractory materials. In the case of the ceramic mold the issue is forced by accelerating the rate of evaporation by igniting the gel all over the face. This results in fine craze cracking structure. Opening of these fine cracks permits the alcohol underneath the surface to come out and this procedure continues from the outside in until the entire block is completely craze cracked. For this reason there are no internal stresses and matter has been lost without shrinkage or gross cracks, but with an enormous number of little cracks. This results in an infinitely ragged mass of refractory particles bonded with pure ??????????