New developments on ceramic raw material preparation and granules production

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ABSTRACT

The traditional ceramic materials are obtained mostly from natural raw materials. Advanced ceramic materials with new features and properties higher than those of traditional ceramic materials are obtained, however, mostly synthetic products. Different products require using different raw materials and process. The basic tile making process consists of crushing, preblending and mixing, grinding and homogenization, wet or dry granule making process steps. After producing granules; pressing powder into the desired shape and drying process are applied together with some sub-process according to the desired products.

Increased energy costs is the factor that more than anything else over the last two decayed has stimulated research and the application in the ceramic industry of technologies developed to reduce the energy consumption.

The available raw materials require optimum selection and operation of size reduction process those are crushers and grinding mills. In this article; the overall summary of the traditional and newly developed communition machines and separator machines are introduced together with the models to optimum selection of such systems according to the used ceramic raw material types.

Also the usage of preblending systems and the controlling of the chemical and mineralogical composition of the prepared slip play very important role on the process economy and the final product qualities. The progresses of pre-blending systems and the on-line chemical analyzers are introduced.

In ceramic tile manufacturing industry, the wet process including wet grinding and spray drying, is widely used for preparing granule. However, due to the high energy

consumption for the water evaporation in spray dryer has become a major problem in wet process. In recent years, there have also been vast amount of researches for developing energy efficient systems. The developed new systems have big potential to reduce heat energy consumption and water usage. These systems have also other environmental advantages due to the reduction of emissions of greenhouse gases and an economy deriving from the elimination of the cost of deflocculates. In this areas; the Dry Granulation Processes and the newly developed system called as Semi-Wet Process details are introduced. The industrial applications of the newly developed systems and their performances are also evaluated.