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PRELIMINARY RESULTS OF STEAM PROCESSED SLAGS PRODUCED BY SPRAY GRANULATION (PILOT-PROJECT DGM-TRIBOVENT/LORÜNS): MINERALOGICAL AND PHYSICAL PARAMETERS

by

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Introduction

In order to produce suitable precursor material for the production of cement a pilot plant (situated in Lorüns near Bludenz/Vorarlberg/Austria) based on spray granulation of melts has been built. Mineralogical characterisation and investigation of various physical parameters and the influence on processing parameters on the processed products will be the major work during this project. The project is carried out by the "TRIBOVENT process engineering company" Other members of this interdisciplinary project deal with the technical processing (Universities of Stuttgart and Bremen) and the areodynamic behavior of hot melt (University of Erlangen and the German Aero Space Center).

The material concept

The main idea of the project is to substitute calc-clay as precursor cement material, which is not available everywhere and a relatively expensive raw material compared to the large amounts of slags, which are produced during various metallurgical processes. On the other hand this new production method should replace most of the grinding processes in cement industry, since these belong to the most cost-intensively procedures. The DGM ("Dampf Granulier Mühle")/STM ("Steam Granulation Mill") should produce a microgranulate, with a mean grain size of about 20 microns and a crystalline phase content below 1%.

The technical concept

Melt of about 1500 to 1600°C produced in rotating furnaces is poured into a nozzle-system consisting of SiC ceramics/high-T alloys. The actual granluation process is carried out with the aid of supersonic hot water steam.

The first products

The first run at the pilot plant already exhibited encouraging results concerning amorphous phase content and specific surface. However, the product itself did not show grains with more or less isomorphic shape – it showed fine needles. Varying the process parameters more isomorphic grains have been produced with grain sizes about 200 micrometers and crystalline phase content of about 10% (mainly quartz and gehlenite).

Further investigations and adjustments of the processing parameters (melt chemistry, melt viscosity, nozzle diameter variation, supersonic velocity variations etc.) are under way.