Abstract

New methods for the characterization of moulding sands with respect to mathematical modelling of their compaction

The quality of castings produced in sand moulds depend on the quality of mould and moulding sand. Furthermore, the moulding sand is influenced by a big number of factors, e. g. strength, permeability and density.

For the optimisation and improvement of the sand compaction process it is need to have knowledge about adhesion and cohesion forces, since they influence the flowability of the mould sand in the flask.

In the foundry industry many and exactly defined methods of characterizing of moulding sands are exist, but they often not reflecting the state of the moulding sand in the compacted mould, so that the measurement of these methods, e. g. the green strength, gives not explanation for the appearance of mould and casting defects. For these reasons it is need to seek new methods for the characterization of the moulding sand behaviour while the compaction.

In the case of mathematical modelling and simulation for the prediction of the compaction of bentonite bonded moulding sand new strength and deformation parameters are need, which must be measured by new methods. On the basis of a sheer equipment, used in the mechanic of ground, a new construction was developed. The parameters for the simulation, e. g. compactability, cohesion as well as the inner and outside friction, can be measured by the new device. For the determination of interactivity between the above called properties and the density investigations were carried out by this new device. In order to determine the distribution of the strength into the test piece and the influence of the compaction method the cohesion of the moulding sand in different levels of the test piece was measured. The use of these values as coefficients in the mathematical models for the simulation of the compaction process has demonstrated, that the new method is a very good equipment for the determination of compaction properties of moulding sands.