Interdisciplinary Project (IDP)

Development of a particle model for the simulation of the strength of inorganically bound core materials in an open-source C++-program

Motivation

In contrast to other casting processes, a high degree of design freedom in die casting process can only be achieved by using expensive salt cores due to the high loads involved. Other processes with lower process pressures allow the use of cores made of bonded sand, which are much cheaper to produce using the core shooting method. In order to transfer the advantage of the inexpensive core production to the die casting process, the strength of inorganically bound sand cores with different particle structures needs to be investigated by simulation.

Project details

For the simulation of the material structure, the use of an open source software called MercuryDPM is planned, which recently has been developed at the University of Twente in the Netherlands and is implemented in C++. In line with the IDP, a particle model for inorganically bound core sands shall be developed to obtain the strength of the material by simulation using the above-mentioned software. Finally, the project contains the following work packages:

- Composition of a material model for inorganically bound core sands
- Simulation of strength with variation of material parameters
- Validation of the model by strength measurements on sand core samples with a bending machine

Contact

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