MinSiDeg

Minimize sinter degradation and segregation between sinter plant and blast furnace

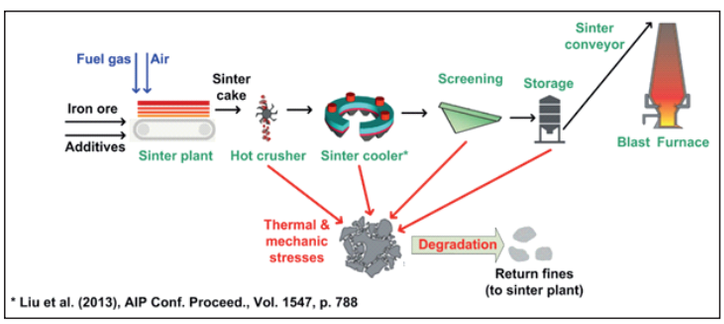

Figure 1: Illustration of iron ore sinter and causes for degradation on the way to blast furnace

To ensure a sufficient gas distribution in the blast furnace, fine-grained input materials must be agglomerated by sintering. Between sinter plant and blast furnace the sinter passes through various conveying systems, coolers, sieves, and bunkers, see . Due to mechanical stress the sinter degrades partly. Before charging the blast furnace the resulting fines < 5mm are screened out and are fed to the sinter plant again. As iron ore sintering is a highly energy consuming process, these return fines cause high costs and emissions. Additionally, segregation effects during transport and storing lead to fluctuations in the particle size distribution, thus to fluctuations of the gas distribution in the blast furnace.

The aim of this project is to reduce costs and emissions by minimizing return fines and segregation. MinSiDeg received funding by the EU and is executed by 6 partners in Austria and Germany. The project runs from 07/2019 to 12/2022 and the team for conveying systems is responsible for two important work packages.

At first the breakage behavior of sinter was analyzed. Especially the particle size distribution after damaging events is an important aspect for discrete element simulations. Because of great heterogeneity and big differences in particle shapes, a high number of tests was necessary. Therefore, a special test rig and methodology was developed.

Based on the test results a suitable breakage model for sinter in discrete element simulations will be developed in order to optimize critical sections in existing sinter transportation and storage plants, see Figure 2. Furthermore, innovative transportation, transfer and storage systems will be tested to save return fines and stabilize particle size distribution.

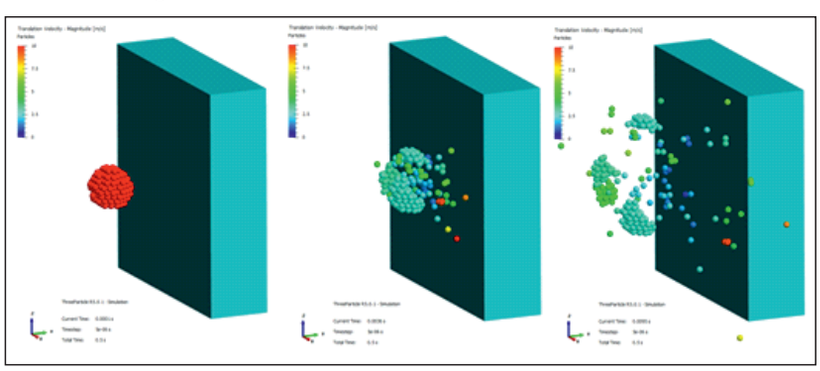

Figure 2: Discrete element simulation of breakage with the bonded particle model

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