Abstract:
The availability of high quality coking coals in the world hard coal deposits is shrinking and lead to an increase in their prices. But for the traditional production of hot metal from iron ore the blast furnace needs to be fed with good qualities of coke. The development of alternative smelting reduction processes, especially in case of COREX® and FINEX®, has reached the state of industrial production. The advantage of these technologies is the use of thermal coal as reduction agent. That means feasible raw material in a bigger range of properties is available at lower costs.

The COREX®/FINEX® technologies need to be fed with lumpy coal. Normally thermal hard coal after transport to the location of the plants contains 30 to 50 % fines which are not feasible for direct feeding into COREX®/FINEX® melter-gasifier. To make the substantial amounts of fines usable for the smelting reduction processes they have to be agglomerated using binder briquetting technology which has to be applied in an optimal way.

The aim of the research is to generate hard coal briquettes which have the required mechanical strength as well as optimal process behaviour in COREX®/FINEX® melter-gasifier. To fit in these requirements the type and the optimal amount of binder is really important because both influence the briquettes properties. Besides this, binder type and amount are important economically factors, too. The article will give an insight on the major topics of current research and address the special problems with regard to methods for briquetting (e. g. optimal briquetting pressure and temperature as well as feasible grain size distributions of the feed), determination of briquettes quality (strength and process behaviour) and results from the up-to-date done experiments.

For the experiments typical COREX®/FINEX® hard coals from deposits in Australia and South Africa are used. As binder different amounts of bitumen, molasses and polyvinyl acetate are applied. Besides the pure mechanical properties of the briquettes like crushing strength, abrasion strength and shatter strength their behaviour under different heating conditions and atmospheres is investigated, too. With the binder molasses in cooperation with calcium hydroxide and water the best strength and also response to heating-up is achieved. The binder bitumen produces also high strength but there are more problems while heating-up found. One reason for this effect is the different mode of action of film-type and matrix-type binders.

Keywords: metallurgical carbon carrier, hard coal briquetting, agglomeration, binder

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