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Evaluation of the Usage of Secondary Iron Ore Pellets in the DRI-EAF-Process

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The metal industries face huge challenges in terms of sustainability, diminishing resources and the need for higher recycling rates. As an example, the alumina production creates red mud as the by-product of the Bayer-Process for the conversion of bauxite to alumina. Due to its environmental impact, it is stored in residue storage areas like dammed ponds or landfills. On the other hand, it is a huge source of raw material, since it contains a high amount of iron oxides of up to 60 wt-%. With a new process the haematite content can be increased to more than 80 wt-%, which makes it attractive as a secondary raw material for the steel production. It would be a promising step towards a resource-saving economy and a strong link between the aluminium and steel industry.

These secondary iron ore pellets (SIOP) can be used as a feed for the DRI-EAF process which should be the medium and long-term process for Europe's steel industry due to the ambitious climate goals. Due to the higher rates of gangue (especially Al_2O_3 and TiO_2) it cannot be a direct substitute for normal iron ore pellets. Based on the analysis of the slag composition in the EAF, it is shown that a usage of up to 10 % of SIOP with 90 % of DR-pellets should be possible to keep the Al_2O_3 content in the range of 12 %. As an additional effect, the amount of slag will increase by 13 %, which lowers the yield and the energy efficiency of the EAF. Despite the challenging effects on the performance of the DRI-EAF process, the usage of SIOP might be an economically advantageous option and will avoid the deposition of huge amounts of red mud.

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