

Engineering iron ore pellets to reduce their dustiness

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Introduction

Iron ore pellets are hard spheres made by agglomerating iron ore concentrate and binders. Pellets are the preferred iron-bearing feed for blast furnace ironmaking. Starch has been proposed as a binder because it has good adhesive properties, does not contaminate pellets and is relatively cheap. However, starch binders typically lead to weak pellets with rough surfaces, and these can cause high levels of dust within process equipment and when pellets are handled and shipped (Halt and Kawatra, 2014). Our research shows that by adding a small quantity of other additives, pellets made with starch binders become smooth and strong. The newly designed binder leads to significantly lower levels of fines when pellets are handled.

Methods

Iron ore pellets were made with three types of binders: starch, starch-bentonite, and starch-additive A.

Iron ore concentrate, bentonite and starch were received from industrial suppliers. The additive "A" was a reagent grade chemical. The pelletizing and testing procedures can be found in Halt and Kawatra (2015). Binder dosages are given in Fig. 1.

Results and conclusions

When a small amount of additive A was used in addition to starch, pellet strength significantly increased (Fig. 1a) and fines generation significantly decreased (Fig. 1b). Fines generation was around 30 to 50 percent lower compared with pellets made using only starch. Additive A led to pellets with similar quality as those made using bentonite, but additive A doses were much lower. In addition to promoting high strength and low dustiness, the starch-additive-A binder is completely organic. The newly designed binder may be a good alternative to bentonite, especially when making high-purity pellets.

References

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- Halt, J.A., and Kawatra, S.K., 2015, "Iron ore pellet dustiness Part II: Effects of firing route and abrasion resistance on fines and dust generation," *Minerals Processing and Extractive Metallurgy Review*, Vol. 36, No. 5, pp. 340-347.

Minerals & Metallurgical Processing, 2016, Vol. 33, No. 3, p. 156.

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<http://dx.doi.org/10.19150/mmp.6753>

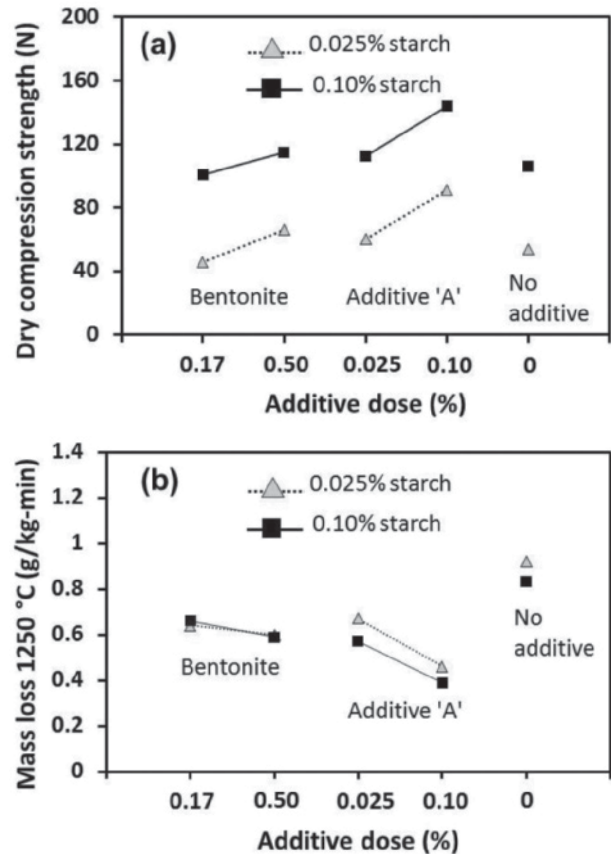


Figure 1 — Dry compression strength (a) and mass loss by abrasion (b) of iron ore pellets made with starch-based binders. Pellets were 11.2-12.7 mm in diameter.