

## **Development and Successful Evaluation of an Atmosphere-Controlled Furnace for Direct-Reduction Feedstock Studies**

A novel atmosphere-controlled furnace was successfully developed by Lhoist, which allows the company to take active part in the process transformations of iron and steel making towards a CO<sub>2</sub> emission free industry. This furnace is designed to perform qualitative metallurgical research on e.g. reduction behaviors of iron ore feedstocks in controlled mixed-gas atmospheres (CO, CO<sub>2</sub>, H<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>, CH<sub>4</sub>, SO<sub>x</sub>) until 1000 °C. Despite currently available furnaces, the Lhoist Vario Furnace is additionally designed to fit with three conditions: 1) reduced amount of material per metallurgical test needed, 2) different metallurgical tests available with the same furnace, 3) simulation of different environments such as direct-reduction or blast furnace. The development of the Lhoist Vario Furnace experimental setup and the optimization of internal gas flows will be described as well as the process of adaptation for certain metallurgical tests: e.g. reducibility, swelling, reduction-disintegration. These tests have been performed on two types of industrial pellets. The degree of reduction (RD) for these two types of pellets was determined to be (66.1±0.5)% and (50.9±0.4)% respectively. This experimental setup allows Lhoist to conduct comparative metallurgical studies of iron ore feedstocks e.g. pellets for direct-reduction and blast furnaces.

### **Speaker Country**

Belgium

**Primary author:** Dr FIRSBACH, Felix (Lhoist S.A.)

**Co-authors:** Mr SOUCHON, Bryan (Lhoist S.A.); Dr NISPEL, Michael (Lhoist S.A.)

**Presenter:** Dr FIRSBACH, Felix (Lhoist S.A.)

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