

PAUL WURTH SERVICING**MATERIAL TRIAL & TEST FOR RHF**

Laboratory furnace for direct reduction test

VALIDATION OF THE PROCESS

For unknown ore mixtures to be possibly processed in a Rotary Hearth Furnace (RHF), it is essential to perform laboratory test campaigns, which will supply all the necessary information to validate the coal-based Direct Reduction process in the RHF.

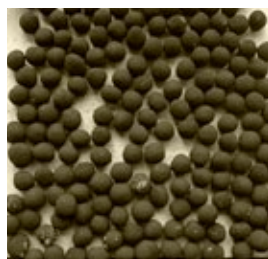
What kind of raw materials can be processed?

The RHF can be used for reducing any kind of oxidised raw materials, either lumps or fines, such as:

- Iron ore - even with low Fe content - to produce hot metal via a Submerged Arc Furnace (SAF);
- Residues from integrated steel works, to obtain Hot Briquetted Iron (HBI) to be charged into a Blast Furnace or a Basic Oxygen Furnace;
- Residues from stainless steel plants, to recover Ni & Cr hot metal;
- Non-ferrous (Ni, Cr, Mn, etc.) ore, before melting in a Submerged Arc Furnace (SAF);
- Residues from non-ferrous processes, to extract valuable metals.

What are the key factors for a successful processing?

- **Material Preparation Processes:** Each material preparation step needs to be carefully studied and all the possible process alternatives have to be evaluated, in order to define the optimum preparation cycle. The feasibility of this optimum cycle must finally be confirmed by suitable experimental tests.
- **Direct Reduction:** Operating parameters of the RHF (residence time, temperature) and the obtained metallisation degree have to be carefully evaluated in order to define the feasibility of the process.





MATERIAL TRIAL & TEST FOR RHF

The steps of a typical test campaign

A typical test campaign consists in preparing a number of mixtures to cover the possible operational range. Each mixture is pelletised or extruded, and pellets are dried. Preliminary decrepitation tests are performed to identify the maximum input temperature in the furnace and the need for anti-decrepitation agents. A number of firing tests is done, with different mixtures and different furnace operating conditions (temperatures, residence time, bed thickness etc.). For each of them, the chemistry of the input and output

properties are analysed (chemistry, size, strength etc.). Finally, briquetting tests can be performed, including the mechanical tests to characterise the briquettes.

As an alternative, pre-reduced material can be melted in an electric furnace: this melting test can be useful to evaluate melting properties of Direct Reduced Iron (DRI) and chemical analysis of melted products.

Why to charge Paul Wurth with your material trial and test?

Paul Wurth cooperates with laboratories equipped to perform the above described activities. Test procedures have been tuned and optimised on the basis of return data from industrial plants in operation.

Upon customer's request, Paul Wurth offers the possibility to carry out feasibility studies to evaluate the coal-based Direct Reduction process in a RHF for a specific ore mixture and local conditions. These studies are based on our previous experiences, on test campaign results (in case of unknown raw materials) and on a deep analysis (both technical and economic) of the local operating conditions.



Example of green pellets