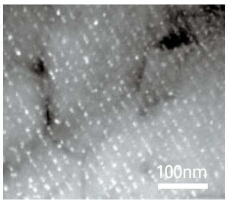
Efforts at Steel Research Laboratory

High Tensile Strength Steel Sheet- NANO HITEN, the world first application of nanotechnology

Improved fuel consumption by reducing auto body weight is indispensable for protecting the global environment. However, simply reducing the thickness of steel sheets to reduce body weight would cause safety and performance problems. Steel Research Laboratory was the first steelmaker in the world to apply nanotechnology to the development of a high strength sheet, called "NANO HITEN," which makes it possible to reduce sheet thickness without sacrificing essential functions. The properties of NANO HITEN are dramatically improved by controlling the microstructure at the nano level (10^{-9} meter), breaking the conventional micron (10^{-6} meter) barrier.



Nano precipitation

This makes it possible to use thinner sheets than with conventional high strength sheets, while also maintaining crashworthiness. NANO HITEN satisfies both high strength and high formability requirements and contributes to improved fuel economy through auto weight reduction.


Example of application of NANO HITEN

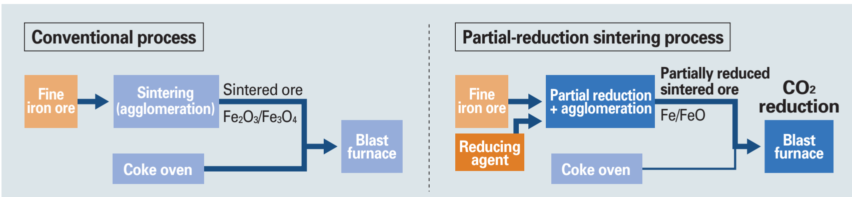
New Sintering Process for Low-CO_2 Emissions

The ironmaking process, centering on the blast furnace, accounts for more than half of all CO_2 emissions in steel manufacturing.

Since FY2002, the Steel Research Laboratory has been developing an "Innovative Sintering Process for Reducing CO_2 Emissions" under METI's "Rational Energy Use Technology Development Support Project (Development of Innovative Technologies for Preventing Global Warming)" (currently under NEDO). Based on the existing sintering plant, in the new process, agglomeration and high-rate partial reduction of fine iron ore are performed simultaneously by adding excess coke fines as reducing agent. The product greatly reduces the consumption of carbon materials for reducing agent in the blast furnace. The potential of the new process has already been proved in the basic test at pilot plant.

By using the continuous sintering simulator (max. production capacity:3.0 ton/hr), the Steel Research Laboratory plans to confirm the reduction rate and productivity for application to actual processes, and will study items to improve in existing sintering plants.

Conventional process and partial-reduction sintering process



"New Activated Coke Production Process" to Reduce Energy Consumption

Activated coke is expected to see increasing use as a carbon adsorbent in flue gas/water treatment. However, many commercial activated coke products use coal as a material, and large quantities of fuel are consumed in the carbonization/activation processes. In particular, it had been considered difficult to reduce fuel consumption for activation because this process is critical for determining the properties of activated coke.

Since 2002, the Steel Research Laboratory has been carrying out R&D on a new activated coke production process as a "Practical Industrial Technology Development Support Project (Oil-substitute Energy Technology Development Support Project)" under NEDO. As raw materials, various organic wastes, including wood from construction, waste paper, and waste plastic are used in place of coal, making it possible to omit the activation process, which had been essential in the conventional coal-based process. Fuel consumption is also greatly reduced by employing a rocking-type carbonizing kiln which is capable of utilizing the combustible carbonization gas generated by the organic waste itself as energy for carbonization.


Activated coke

The high-calorie gas generated during precarbonization can be recovered and used effectively as a heat source, either in the coke process itself or in other steelworks processes. After use as an absorbent for flue gas/water treatment, the activated coke can be used as a reductant for iron ore in a cascade-type recycling process.


Rocking-type carbonizing kiln