PRODUCT QUALITY CONSERVATION SYSTEM

IMPROVING DIRECT REDUCTION PLANTS

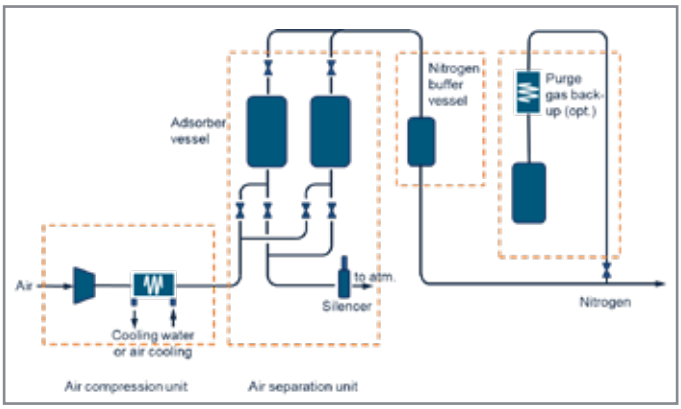
TECHNICAL SOLUTION

Hot DRI exiting the dry furnace is highly reactive and therefore has to be inerted with seal gas. As the dry seal gas contains a small amount of oxygen and CO_2, some reoxidation takes place. These gases reduce the product quality, while the use of high-purity nitrogen instead of dry seal gas eliminates this reoxidation and keeps product quality at highest posasible level.

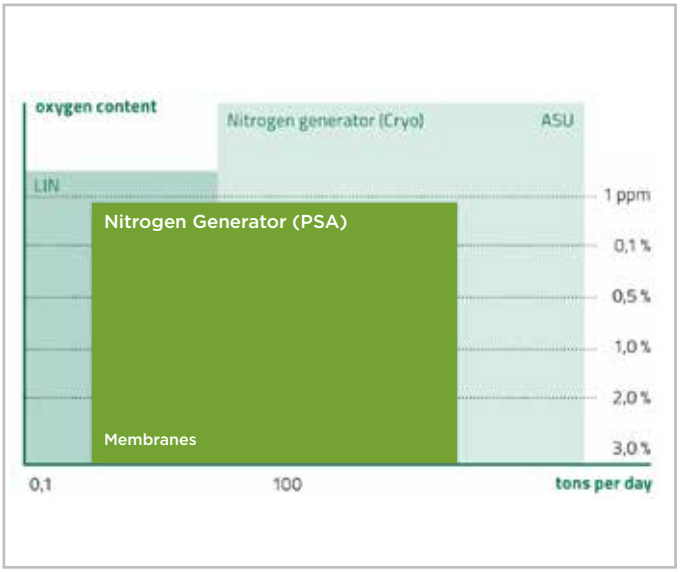
Nitrogen is often either unavailable or has to be purchased externally for a high price. The Product Quality Conservation System (PQCS) enables the onsite production of low-cost high-purity nitrogen, resulting in a high DRI product quality. Nitrogen is used by plant operators in order to increase HDRI/HBI product quality.

Additionally, the emission of undesirable gas components such as CO can be reduced by more than 60%.

The main components of a PQCS system are an air compression unit, N_2-PSA (preasure swing absorption) unit, nitrogen buffer vessel, and interface equipment (mechanical as well as electrical/automation). Proper integration into the seal gas, purge gas, utility and E&A system of an existing MIDREX plant is of utmost importance and can be executed by Primetals Technologies.



Simplified flow sheet of the Product Quality Conservation System



Field of application of nitrogen generator

Nitrogen generator (nitrogen purity: 99,9 vol%)

GENERAL FEATURES OF THE PRODUCT QUALITY CONSERVATION SYSTEM:

- Fast start-up
- Fully automatic and unattended operation
- Product flexibility regarding nitrogen flow and purity
- Completely pre-manufactured skids
- High availability and reliability

MAIN DATA

Two examples of PQCS configuration

	Case 1	Case 2
PQCS plant capacity:	5,000 Nm^3/h	3,500 Nm^3/h
Product gas analysis: - Nitrogen & Argon - Oxygen - Carbon dioxide	 ≥ 99.0 vol % ≤ 1.0 vol % < 10 ppmv	 ≥ 99.9 vol % ≤ 0.1 vol % < 10 ppmv
Nitrogen delivery pressure	up to 7 bar*	up to 7 bar*

* upon customers request

MAIN ADVANTAGES

- Low-cost production of N_2 for use instead of dry seal gas
- Reduction of undesirable gas components, e.g. CO, by more than 60%
- Increased plant availability (e.g. full back-up system for bottom seal gas compressor)
- Higher DRI production rate or increase of DRI product metallization
- Increase in DRI carbon content

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