

Optimised metallurgical gold leach technology from Afrox

Understanding oxygen demand is absolutely critical to ensuring successful metallurgical gold leach optimisation, says Rob de Zoeten, metallurgist at Afrox. “The importance of accurately establishing total oxygen requirement is often overlooked and unfortunately in many cases undersized on-site oxygen plants are installed which cannot produce sufficient oxygen to optimise the leach.”

As market leaders in this field, Afrox has developed a unique and fully integrated end-to-end product service offering (PSO) for the global gold mining industry to optimise metallurgical gold leach using oxygen. The PSO, called Goldox™, provides:

- an oxygen demand test programme for **specifying the oxygen demand requirements**;
- the supply of oxygen using Linde Engineering’s proprietary state-of-the-art onsite **Vacuum Pressure Swing Adsorption (VPSA) technology**;
- **supply, install and commission** of the oxygen reticulation network, flow control panels with safety interlocks and the oxygen injection system;
- on-going maintenance and **downstream oxygen control** management if required; and
- provision of a highly flexible **commercial structure** for the supply of oxygen to the mine over an agreed period.

The Linde Group is a world leader in the generation of low purity (90-95%) oxygen, which is proven to be ideal for gold leaching, through the use of its proprietary Vacuum Pressure Swing Adsorption (VPSA) technology. As a member of The Linde Group, Afrox can provide accurate guidance to gold mines regarding their oxygen requirements for both new and existing leach plants.

Linde Engineering’s oxygen VPSA systems will enable gold mines to achieve improved gold recoveries, higher plant productivity and throughput, greater energy efficiency and superior environmental performance.

VPSA is an ambient temperature technology which takes advantage of the different binding capabilities of various gas molecules to a solid, porous material such as zeolites. The VPSA process cycles between adsorption and desorption of impurities as the feed gas flows through adsorber vessels in order to produce a continuous high purity product gas. Since heating or cooling is not required, cycle time can be short, usually less than a minute, which results in a long lifetime for the adsorbent material.

Recent advances in adsorption technology and system design by Linde Engineering have enabled oxygen VPSA plants to become less expensive, more power-efficient and smaller in size. The result is that an oxygen VPSA system offers a very cost-competitive, flexible oxygen supply solution which has demonstrated excellent results in a variety of commercial applications in the mining, chemical and refining industries on a global basis.

For low purity (<95%) applications with flow rates from 10 - 342 tpd, which are the typical requirements for gold mining applications, VPSA has proven to be the most cost-effective solution. The VPSA plants have a very low specific energy consumption, operate at low pressure, with booster compressor to achieve customer pressure demands. They offer an extremely competitive capital and operating cost per tonne of oxygen produced. VPSA plants provide oxygen on demand with easy

turndown from 0 - 100%, have high availability, are fully automatic, and can be remote controlled and monitored. Furthermore, VPSA plants are standardised with a modular construction, enabling reduced field construction and commissioning time.

As part of the Goldox™ PSO, Afrox can also offer a downstream oxygen management service where Afrox operates and maintains the oxygen injection equipment to achieve the desired dissolved oxygen (DO) levels in the leach as required, thereby freeing up the plant metallurgists to concentrate on managing the gold plant.

“The supply of oxygen to the gold leach needs to be supplemented by an efficient injection system to ensure optimum oxygen utilisation in the slurry, otherwise the benefit of the oxygen injection may be limited,” explains de Zoeten.

Afrox will also, through Linde Engineering, manufacture, supply, deliver, install and commission plants throughout Africa and will operate and maintain these plants to supply oxygen to its customers.

Andy Gouws, Afrox’s commercial and business development manager for Africa, notes: “Afrox is able to offer a highly flexible commercial build, own and operate supply scheme, where it invests in the VPSA plant and supplies oxygen over the fence to its customers to provide an uninterrupted supply of oxygen over an agreed contract period.

“The VPSA plant will be manned by experienced and trained operators. In addition, the plant will be remotely monitored from Afrox’s control centre in South Africa for trouble-shooting and to ensure high reliability of supply to its customers.”

Afrox and Linde Engineering have built up a strong brand reputation for its VPSA technology, utilising high quality components, and has considerable expertise in the safe, reliable and cost-effective operation of PSA and VPSA plants over many years with more than 700 reference sites including the largest single train VPSA plant in the world.

Issued by: Serendipity Events, Promotions & Exhibitions

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