

Pneumatic expertise integral part of handling systems for power plant

INTRODUCTION

Alternative and renewable sources of energy are a major concern not only due to limited fossil fuel resources, but also within the context of the worldwide efforts to limit gas emissions, writes *Alain de Visscher, commercial director of VIGAN Engineering SA*. New power plants as well as some existing energy producers are upgrading their existing technologies with latest innovations, in order to fulfill their legal obligations of protecting the environment while containing costs.

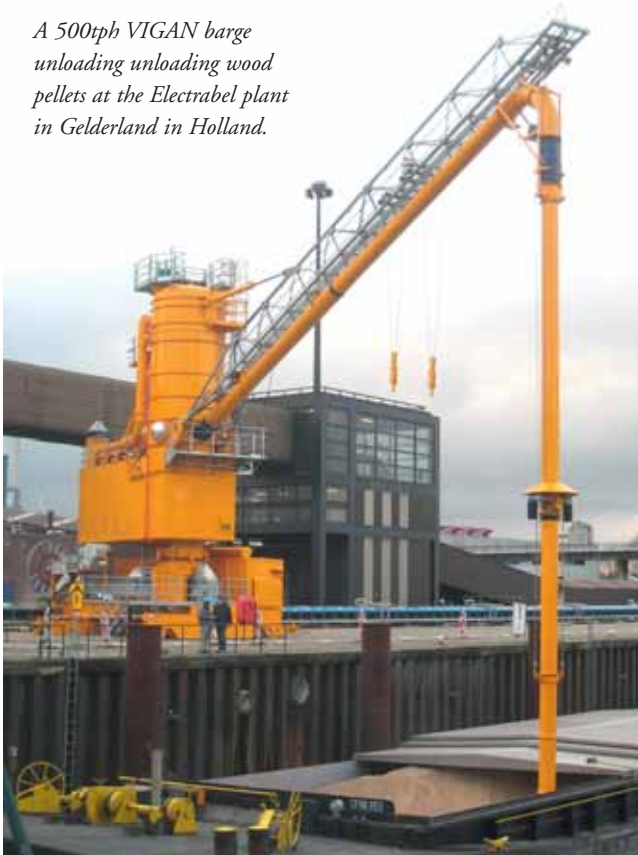
The French group Suez is a major player in Europe and worldwide, with about 200,000 workers and an annual turnover of more than US \$110 billion. Suez has integrated this approach for many years, with very significant investment in engineering developments and state-of-the-art industrial installations.

Electrabel, the electricity division of the group, developed a special project during the last few years for its power plant in Gelderland (Nijmegen, The Netherlands) of a capacity of about 600MW. Tractebel, its Belgian engineering affiliate was in charge of developing this co-firing project (biomass and coal), by increasing the incorporation of wood pellets by about ten times (from 8tph [tonnes per hour] to 75tph), up to a rate of 20% of the total energy produced by this upgraded plant. Since its operational start in 2010, this Electrabel power plant has become one of the world's largest co-firing plants with wood pellets.

This co-firing process allows Electrabel to benefit from a large number of 'green certificates'. This system of green certificates is a European mechanism. The promotion of investment in green renewable energy (for example, windmills or biomass power plants) is balanced on the other hand with the obligation for fossil fuel plants to buy those green certificates.

Geldof, a leading supplier of industrial components and turnkey-projects, based in western Belgium, was selected by

A 500tph VIGAN barge unloading unloading wood pellets at the Electrabel plant in Gelderland in Holland.



Electrabel as turnkey contractor for this process transformation, including new installations for the reception and the storage of the estimated 550,000 tonnes per year of wood pellets required by the power plant.

Wood pellets are transported to Electrabel plant by barges from various origins, thanks to the excellent hinterland river and canal system in the Netherlands for bulk transport. Nevertheless, the discharge of such volume for a key sector requesting 24-hours-a-day reliability requires the highest-quality and the most efficient operational performances.

VIGAN Engineering S.A., also a Belgian company, was selected to manufacture and to install the pneumatic unloader for the barges of wood pellets. The company specializes in pneumatic and mechanical ship-unloaders mainly for agri-bulk cargoes, with 40 years of experience and more than 1,150 pieces of equipment deployed around the world.

PNEUMATIC UNLOADING OF WOOD PELLETS

The challenge of transporting any wood residue is usually dealing with the low density of these materials. Therefore the most common process is pelletizing, in order to condense them into granules (usually about 10–15mm length and 5–6mm in diameter).

Thanks to this process and a reasonable content of humidity, the wood pellets are quite free flowing, which allows them to be easily conveyed from the production facility up to their use as an input in the power co-firing with coal.

While being transported to the plant, these pellets can easily break up, with dust being emitted. It is not convenient to use grabs due to several factors, such as important mechanical efforts of quay structure, dust escaping into the environment, eventual spillage that can be difficult and costly to clean up, and, of course, a low 'through the ship' efficiency when unloading small barges.

Pneumatic unloaders, however, are recognized as a more convenient solution for unloading barges, compared to grabs or mechanical unloaders:

- ❖ higher unloading rate mainly during the cleaning of the hold with the intake nozzle being able to suck down to the latest product particle on the hold floor but also to reach the hidden corners.
- ❖ safety: one operator is able to manage the whole unloading operation, not only thanks to a remote control for all major displacements of the suction nozzle into the hold, but also as the driver of an auxiliary skid steer loader, for speeding up the final



Pneumatic unloading of free-flowing wood pellets.

cleaning even further.

- ❖ **environment:** No dust is emitted, as the whole unloading system is under negative pressure and/or totally enclosed.
- ❖ **no spillage** and need to clean the surrounding quay.
- ❖ **minimum breakage** by optimizing the air and product speed in the pipes.
- ❖ **low-weight equipment** with far fewer mechanical efforts on the quay structure.

VIGAN NIV 600 PNEUMATIC SHIP-UNLOADER

For achieving these objectives, VIGAN's NIV 600 model in Gelderland has the latest technologies available, such as the following as a few examples:

- ❖ **three turbo-blower groups (for each four stages) with direct drive, controlled by the latest speed variators (frequency inverters) by Schneider Electric.**

The direct drive is a major improvement because it reduces not only the numbers of bearings on a traditional drive with belts, but also the mechanical efforts on the turbine shaft.

The multi-stage turbo-blowers maximize the suction capabilities for a larger range of product characteristics, and allow material to be handled without needing any special feeding device. Working in combination with the speed control system, it allows the energy consumption to be optimized precisely. Some VIGAN customers reported figures as low as 0.6 to 0.7kWh/tonne, thanks to these technology developments and those chosen by Electrabel.

As also observed in this project, these three turbo-blower groups give the customer a convenient extra reserve of suction power capacity, to face any unexpected event and to guarantee the daily unloading target.

- ❖ **air jet pulse system for automatic cleaning of the filter.**

Widely recognized among the food and feed industry sectors for the global best performances and reliability, this system offers also a major advantage about safety: no running mechanical parts are in contact with the air flow which could be eventually contaminated with dust and therefore could be the origin of explosion.

- ❖ **major reliability** thanks to special alloys that protect against wear, used in the elbow between the vertical and horizontal suction pipes, in the airlock components.

- ❖ **major safety assurance** from the integration of compulsory rules on European engineering design norms, equipment manufacture and human resource protection. The use of alternative sources of energy such as biomass will certainly increase during the coming years and all the logistic aspects of these inputs require very careful approach. Electrabel receives full credit for this landmark project in green electricity production. It also receives the credit for having understood the benefits of the pneumatic technology for a reliable and efficient unloader.

OTHER DEVELOPMENTS AT VIGAN

In other news, VIGAN has confirmed that, at the beginning of the year, it signed a contract with the Sociedad Portuaria de Santa Marta in Colombia, to supply a 600tph NIV 600 pneumatic ship unloader. This unit will be delivered in early 2011.

In January this year, a new 750tph SIMPORTER ship unloader was delivered to Ulsan port in South Korea. This unit will work alongside an older VIGAN machine; both can be seen in the picture below, with the new model on the right.

A new 750tph SIMPORTER was delivered to Ulsan in South Korea in January.

