VIGAN expertise for wood pellet unloading

A co-firing power plant produces more ecological energy with wood pellets

Alternative and renewable sources of energy are a major concern, not only due to limited resources of fossil origin but also within the context of worldwide efforts against gas emissions.

New power plants, as well as some existing energy producers, are upgrading their existing technologies with the 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 at worldwide level with about 200,000 workers and an annual turnover of more than US$110 billions. 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 (city of Nijmegen in The Netherlands) with a capacity of about 600MW.

TRACTEBEL, its Belgian engineering affiliate, was in charge of developing this co-firing project (biomass + coal) by increasing by a factor of around ten (from 8tph [tonnes per hour] to 75tph) the incorporation of wood pellets 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 largest co-firing plants with wood pellets.

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 per day reliability requires the highest quality and the most efficient operational performances.

Newsflash

In 2011, VIGAN commissioned two NIV 600 for wood pellet unloading at RWE co-firing power plant in Tilbury, UK.

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

Pneumatic unloading of wood pellets

The transport of any wood residue involves the challenge presented by the low density of those materials. Therefore, the most common process is pelletizing in order to condense them into granules (usually about 10–15mm in length and a diameter around 5–6 mm).

Thanks to this process and with a reasonable content of humidity, the wood pellets are quite free flowing and therefore easy conveying is possible from the production facility up to its use as an input in the power co-firing with coal.

During transport to the plant, those pellets can easily break and cause dust emissions: the use of grabs is not effective, due to major quay structural requirements, dust emissions, possible

spillages than can be difficult and costly to clean up and, of course, low 'through-the-ship' efficiency when unloading small barges.

Pneumatic unloaders are known to be a more convenient solution for unloading barges, compared with grabs or mechanical unloaders. They offer:

- **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 not only thanks to a remote control for all major displacements of the suction nozzle into the hold, but also by driving an auxiliary skid steer loader for even faster final clean-up;
- **environment:** no dust 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 less mechanical efforts on the quay structure.

The first pneumatic unloaders were manufactured at the end of the 19th century but continuous technological improvements have been introduced for higher reliability, better safety and optimum running costs.

VIGAN NIV 600 PNEUMATIC SHIP UNLOADER

To achieve those objectives, a VIGAN NIV 600 model in Gelderland has all the latest technologies available, such as the following as a few examples:

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

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

  The multi-stage turbo blowers are maximizing the suction capabilities for a larger range of product characteristics to be handled with no need of any special feeding device and in combination with the speed control system, it make feasible to precisely optimize the energy consumption.

  Some VIGAN customers reported figures as low as 0.6 to 0.7kWh/tonne thanks to those technology developments and also chosen by ELECTRABEL.

  As also observed in this project, those three turbo blower groups are giving to the customer a con-venient extra capacity of suction power reserve to face any unexpected event and to guarantee his 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 ad-vantage 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 and safety** of this equipment are also due to special alloys against wear used for instance in the elbow between the vertical and horizontal suction pipes, in the airlock components and generally speaking by integrating most compulsive rules concerning latest European norms about engineering design, 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 tech-nology for a reliable and efficient unloader.