

Food & drink

Sugar milling plant seeks hydraulic pump

The need for an energy conserving pumping solution, that would require minimum installation costs and is flexible in meeting variations in operating of a sugar milling plant, has led a sugar manufacturing company in Kenya to seek a hydraulic oil pump with a complete electric motor. Nzoia Sugar has opted for this hydraulic pumping solution to take advantage of its flexibility to accommodate not only wide range in quality of cane delivered but also in mill settings.

The pump solution, Model No. PF 2006-1807, is what Nzoia Sugar Company, located 450 kilometers west of the capital Nairobi, is looking for to enhance the performance of the miller's feeder roll and mill rolls as it seeks to increase its production volumes from the current 600,000 annually in the long term.

The pumping solution will be designed with built-in relief valves with pressure set at 4000-4500 psi so as to effectively protect the pump and the hydraulic system. The pump being sought will have a flow rate of three gallons per a minute (GPM) at a pressure level of 5000 psi. According to some of the technical specifications by the sugar

milling company, the pump will also have a maximum intermittent pressure of 8000 psi and a rated pressure of 6000 psi.

With the quality of cane processed varying from time to time mainly because of changes in production systems and variations in use of farm inputs by contracted farmers, Nzoia Sugar has opted for this hydraulic pumping solution to take advantage of its flexibility to accommodate not only wide range in quality of cane delivered but also in mill settings.

The company has invited international bids for the manufacture, installation and commissioning of the hydraulic oil pump, International

Hydraulic and Equipment Co. (IHE). However, to ensure acquisition and installation of a high performing pumping solution, the company has set out stringent conditions for whichever company wins the bid.

International hydraulic oil pump manufacturers and suppliers willing to bid for the tender must prove that they are recognized manufacturers of the pump Model no PF 2006-1807 (or equivalent) or authorized agent of (IHE)

The manufacturer or supplier must have a record of three previous satisfactory supplies of hydraulic Oil Pump complete with electric motor within the past 10 years.



Overview of Nzoia Sugar milling factory which is seeking to install a hydraulic oil pump to improve the efficiency of its rollers and other equipment.



Nzoia Sugar Company managing director Mr Saul Wasilwa looks forward to enhanced performance of the sugar mill.



Nzoia Sugar milling factory has recently embarked on installing new equipment like this state of the art sugar branding machine whose performance will be complemented by the hydraulic oil pump.



A sample of a hydraulic oil pump that Nzoia Sugar Company plans to install at its sugar milling plant.

The supplier must also “confirm that all hydraulic Oil Pump complete with electric motor shall be supplied with certificate of conformance to the standard and NSC will have the rights to verify the same from other accredited inspection bodies.”

The pumping solution

Nzoia Sugar Company's CEO Saul Simiyu says the pumping solution is preferred because it will help the milling plant reduce energy losses. The convenience of this pumping solution, he says, also lies in the strength of it going without many gear installations as it will be directly connected with the milling plant's roller shafts.

This, in any hydraulic drive system in a sugar milling installation, is known to drastically cut down on energy losses, a major challenge facing sugar milling companies in Kenya. Although some of them are relying on self-generated power to carry out their milling operations, some have to rely on the national grid which is currently overwhelmed by an 8% annual demand increase.

Conservation of energy in any sugar milling in Kenya is critical. This is because the country's energy supply has been outstripped by demand. Current national grid installed capacity stands at 1,300 MW against a demand of 1,100 MW according to Kenya Electricity Generating Company (KenGen), a state-owned power generator.

The option of energy saving solutions by manufacturers including Nzoia Sugar Company is deliberate. For several months manufacturers have had to bear the high cost of installing diesel-powered generators whenever the state-owned power supplier, Kenya Power, rations electricity supply.

Since more than 70% of Kenya's electricity is sourced from hydro sources, prolonged droughts, a common phenomenon in this part of Africa sometimes cuts the amount that is available for use both at commercial and domestic level.

“Power rationing deals a big blow to the manufacturing sector which is already incurring high production costs in terms of high wages and high fuel prices among others,” says Betty Maina, the chief executive officer of Kenya Association of Manufacturers (KAM), a lobby promoting interests of manufacturers in Kenya.

By installing equipment that would conserve energy, the manufacturers easily cut down on overall operational costs.

Saving energy

Last year KAM carried out an energy consumption audit in about 100 manufacturing firms and concluded that the manufacturers can save up to 40% of their production expenses through installation of energy conserving equipment and use of alternative energy sources.

“So far, KAM has been able to successfully conclude energy audits for 100 companies and we have found that those who have implemented efficiency measures recoup their investments in one year,” says Sylvester Makaka, the energy adviser at the lobby and a manager at the cement-maker Athi River Mining.

The hydraulic oil pump that Nzoia Sugar Company is seeking to install, will supply oil at a constant pressure for lubrication and operation at the sugar milling factory especially in optimising juice extraction operation by rollers. This particular pump enables the rollers to press more fibre against the trash plate to squeeze out more juice.

It will also operate the discharge valve in the vacuum pan discharge system in addition to powering the hydraulic cylinder. Similar pump solutions are also being used in other sugar milling factories in Kenya for supplying lubrication oil to drive bearings at the K85D centrifugals. This pump is also a crucial component in the vibratory screen by supplying lubrication oil bearings.

The acquisition of the hydraulic oil pump alongside an electrical and coupling by Nzoia Sugar factory is a standard procedure for many similar installations in the region and probably elsewhere. The practice enables the factory to maintain the requisite constant pressure required for the operational condition and speeds of the sugar milling plant.



A high performing hydraulic oil pump together with the ongoing modernization is expected to result in high quality sugar like these branded samples.

Installation of the pump will be part of a five-year rehabilitation strategy that Nzoia Sugar has been carrying out on its many machine installations.

Gabriel Situma, the company's production manager, says recently the company has installed a modern tray less clarifier, a juice pre-heater, and a vacuum pan. "The above improvements have seen increased flexibility and throughout in the process system," he says. "More machines are being procured to raise the level to at least 50% of daily production."

Currently Nzoia Sugar is modernizing the milling plant's vacuum generation system by replacing an obsolete cooling tower system with a fully automated spray pond and multi-jet condenser system.

According to Situma, the boosting of the sugar miller's production systems will enable the factory to "increase on efficiency and sugar recovery."

Already necessary precautions have been taken by the sugar miller to ensure once the pump solution is installed, its performance is not compromised and that it effectively supports the other milling plant system to optimise the factory's production.

These will include checking on the oil condition, leakages (which seal its piping

system and reduce pressure). Precaution will also be taken to ensure there is a voltage stabilizer whenever a power operation is switched on.

The company has its own 3,600 hectares of land under sugarcane with affiliated farmers growing the crop in more than 23,500 hectares of land.

Long-term strategy

The installation of new equipment is part of a long-term milling improvement strategy launched in 1989 when the milling capacity was increased to 3,000 tonnes of cane per a day (TCD) up from the previous 2,000TCD. Nzoia Sugar Company has annual production capacity of 78,000 metric tones of brown sugar.

"We have a long term plan to expand the factory capacity from 3,000 TCD to 7,000 TCD," Wasilwa says.

The expansion in capacity will enable the company to venture into co-generation in the near future. "Currently factory rehabilitation and product diversity is being undertaken to enable the company to remain competitive," adds Wasilwa.

The hydraulic process enables sugar milling to take place in several stages and using different equipment before the final product is dried and packed.

Processing of cane at Nzoia sugar factory follows the normal standard processes of the cane being conveyed to the mills through two preparation knives, labeled as number 1 and number 2. It uses one electrical cane knife with capacity of 400 hp before the shredded cane is put in a fibrisor with 1200 hp capacity where it is converted to a pulp-like mass.

A conveyer turns the cane into the mills at the preparation stage before engaging a rubber belt conveyor into the first mill. Nzoia Sugar factory has a tandem of 5 mills where juice is squeezed out progressively by a set of three rollers per mill whose clearance decreases across the mill tandem.

Before the product processing goes to mill five, maceration water is added to help in washing out the sugar from the fibre. The juice from the last mill is pumped back to the fibre before it enters the fourth mill. The company employs compound imbibitions where the process between the mills is repeated.

With the use of steam generated at the boilers, the factory is able to drive its turbines, which in turn drive generators through reduction of gearboxes. The generators produce power used for running all electrically powered equipment in the plant. The steam also drives turbines which drive the first set of the cane knife and the mills. ■

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