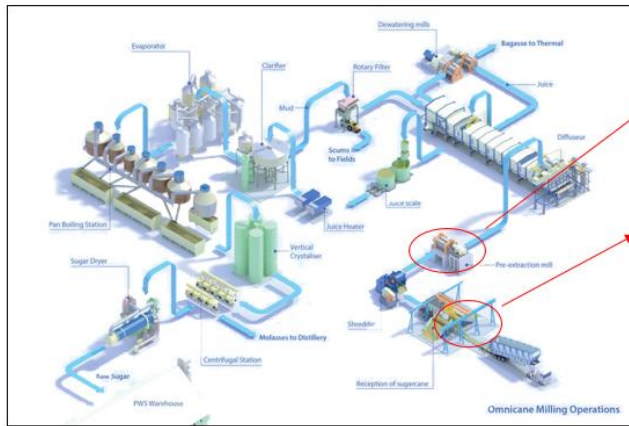I. General

In the sugar industry, AC drives have been widely used in variable torque loads such as fans and pumps, and has achieved obvious energy saving effect. As the important production equipment of sugar factory, the leveler, cane cutter and press always use the traditional control mode to run at a fixed speed. The upgrading of these production equipment is not only effective, but also can greatly improve the efficiency of enterprises.

2. Production process

As we all know, the extraction rate is one of the main factors affecting sugar yield. If the extraction rate is improved by 1%, the total recovery rate is improved by about 0.9%. There are many factors that affect the extraction rate.
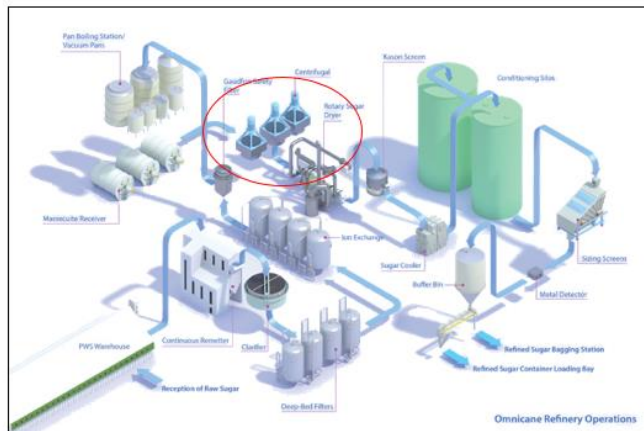
Sugarcane Mill Process

Crusher Mill and Pressure Feeder :
MV Drives and AC Motor with PLC Control
- 6.6kV 1500kW x 5 set for Mill
- 6.6kV 630kW x 5 set for pressure feed

Cane Carrier : LV Inverter Control Speed
with Encoder 250kW x 3 set

Other Machine: for Pump, Fan and
Conveyor
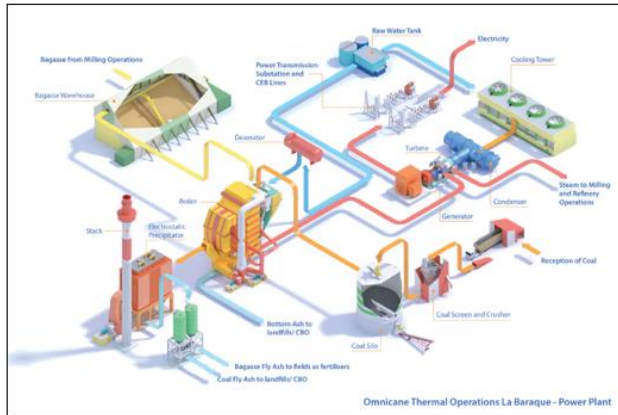Inverter About 20 sets, size around 75kW-
400kW

Cane Sugar Refinery

Centrifugal Machine : AFE Inverter
regent 160kW – 315kW around 10-15 sets

Other Machine: for Pump, Fan and
Conveyor
Inverter About 30 sets, size around 37kW-
400kW

Biomass Thermal Power plant

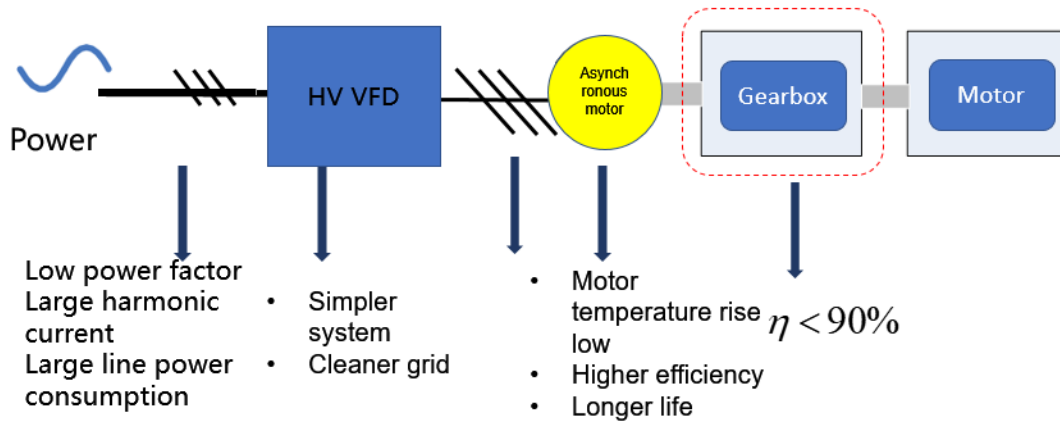**- Induce Draft Fan :** 450-750kW
6.6kV (1 or 2 set / Boiler)

- Force Draft Fan : 250-400kW LV or MV (1 or 2 set / Boiler)

- Feed water Pump : 400 – 630 kW MV (1 set / Boiler)

Because the rotation speed of the press is fixed, the thickness of the sugarcane layer transported from the leveler and the sugarcane cutter often fails to meet the requirements, which will reduce the uniform extraction rate of the sugarcane juice. The lower the extraction rate, the greater the loss of juice, and the lower the yield. If the speed of the press can be adjusted, when the thickness of the sugarcane layer is not enough, the sugarcane layer can be pressed after reaching the normal thickness by reducing the motor speed of the press. In this way, the press will be sufficient, and the uniform extraction rate can be effectively improved. At the same time, due to the reduction of the speed, the purpose of energy saving and power saving can be achieved.

3. Solution

According to the analysis of the production process, in order to improve the extraction rate, it is very important to ensure the thickness of the sugarcane layer, that is, to ensure the uniform load of the motor; in terms of the output electrical signal of the motor, that is to say, to keep the current fluctuation range of the motor within a small range. The actual current of the motor can be detected by increasing the current transmitter as the feedback control signal of the frequency converter, which controls the real-time speed of the motor according to the feedback signal.

Power

HV VFD

Asynchronous motor

Gearbox

Motor

- Low power factor
- Large harmonic current
- Large line power consumption

- Simpler system
- Cleaner grid

- Motor temperature rise low $\eta < 90\%$
- Higher efficiency
- Longer life

- Low power factor
- Motor temperature rise
- Short motor life

Medium voltage inverter + asynchronous motor	690V frequency inverter + asynchronous motor
High voltage, low current, thin cable, convenient wiring	High current, the main cable is very thick, not convenient to connect, and the cable investment is large
Unit drawer structure, optional unit bypass, the unit can continue to run after the unit is damaged	Once an internal group of IGBTs is damaged, the entire machine is completely unusable
Small harmonics (especially high-voltage frequency conversion THD <5%), no impact on the power grid.	The input harmonic is large. (Requires harmonic suppression device)
High voltage, more than 1000m away from the motor	Low voltage and large current, derating should be used when the distance exceeds 100M, and output reactor must be installed
MV internal phase shifting transformer can be directly customized according to grid voltage	Requires additional transformer to convert voltage to 690V