EKOTON INDUSTRIAL GROUP

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TECHNOLOGIES AND EQUIPMENT

CASE STUDY:

MANUFACTURING AND INSTALLATION OF FILTER PRESSES ON HOROKHIV SUGAR PLANT

INTRODUCTION:

EKOTON Industrial Group engages in production and supplying wastewater treatment plants with equipment since 1995. Over the years of work, the equipment assortment has constantly grown – dewatering and filtration of sludge and slurries are among company development directions. Today EKOTON produces multi-disc screw and roll presses, belt filter presses, chamber-membrane filter presses. The first and the second equipment are better for wastewater sludge dewatering, while the chamber-membrane filter press is more used for technological slurry filtration.

At the end of 2016, PE “Agro-Express-Service” applied to EKOTON company with the task of chamber filter presses production for filtration of first carbonated juice slurry in Horokhiv Sugar Plant, Volyn oblast, Ukraine. Bankruptcy procedure, owner replacement, a part of metallic installations and equipment removal from the plant have made some complications. In fact, reconstruction of all technological process stages have been accomplished before the season of work has started. Filtration site was dismantled, there were no basic equipment, pumps, tanks, or cake removal machinery.

BUYER	Horokhiv Sugar Plant
ACTIVITY	Sugar production from sugar beet
FEATURES	Slurry of first carbonated juice
BEFORE	Equipment was dismantled

TASK:

From the technical point of view production of filter presses was needed for a sugar plant with 8000 tons of beets per day capacity and density of first carbonated juice slurry of about 1,18 1,2 g/cm^3. Together with technical plant specialists, a joint technological solution was made based on implementation of three chamber filter presses with area of 170 m^2 and cake thickness of 50 mm each. A technological chart of filtration site with all necessary equipment: slurry feeding and filtrate discharging, cake washing, cake blowing, water and acid filtering cloth regeneration were also agreed. It was decided to use a belt conveyors for cake removal with unloading into the dump truck.

WORK DESCRIPTION:

The technological production cycle including individual design of documentation took 6 months. After equipment delivery, the installation of the filter presses under EKOTON expert supervision was began. Simultaneous assembling of equipment, operation platforms, building constructions was one of the main features of the work. For the same reason it was decided to made cabling of chart right on the site. The total time of the work including installation, cabling, connecting, programming with all chart adjustments was more than 2 months. It is important to note that the successful result of the work was achieved only through joint work of the specialists from the plant and EKOTON IG as well as assembling company.

Fig. 1. Beginning of installation

Fig. 2. Ready-to-use filter presses

RESULTS:

Parameter	Value
Plant capacity	8000 tons of beet per day
Actual productivity	6300 – 6500 tons of beet per day
Operation mode	24 hours per day
Slurry	slurry of first carbonated juice
Slurry density	1.18 – 1.2 g/cm^3
Slurry capacity	50 – 60 m^3/h
Sugar content in filtering cake	0.02 – 0.04 % of beet weight
Filtering cake moisture	35 – 40 %

Technological and financial viability of juice and slurry of carbonated juice filtration using chamber-membrane filter presses are well known. Low sugar contents in filtering cake (up to 0.02 % of beet weight) concurrently with low level of washing filtrate dilution with water (1… 3 %) are the main and the most valuable benefits. The washing filtrate on the plant is taken on lime slaking so there is a possibility of additional cake washing for an extra sugar elution although the filter press valve-collector system also allows to methodically carry out two-stage cake washing with separate filtrate discharging depending on dissolved solid content.

Fig. 3. Filter press control cabinet

Fig. 4. Filtered cake

While the actual amount of beet processing is 6300-6500 tons of per day, three filter presses are working with prolonged interruptions between cycles. Common operation cycle of first carbonated juice slurry filtration can be divided into three periods with approximately equal durations – filtration itself, cake washing and cake removing. Filter press clamping/unclamping, tray operation, cake blowing are significantly shorter. Such time distribution allows to organize three filter press operation in a sequence – only one slurry feeding line and only one washing feeding line are used in the scheme at the same moment. Control system of each filter presses “knows” about the state of two others and doesn’t start corresponding operations until it receives a permission from filter presses control systems together with signals from level gauges in corresponding tanks.

It should be noted that efficiency and productivity of first carbonated juice slurry filtration is significantly depends on the maintenance of the optimum capacities of feeding pumps, cake washing pumps and cake removal devices. For example, previously installed pump for cake washing had too low feeding (up to 5 m^3/h with pressure of 2 bars) which led to long and poor process efficiency. As a result, productivity decreasing and high sugar content in filtration cake were observed. After the pump replacement by more powerful one was done, washing process began to run in a normal mode with a flow of 25-30 m^3/h at a pressure of 6 bar.

Sugar plant operates seasonally without interruptions, weekends and possibility to make long-time repairs or service. All stages in technological scheme are of the same importance and filtering of the first carbonated juice is only one of them. Well-adjusted filter press type, coherency in technological decisions, adjustment of optimal operating parameters at commissioning – all this together can guarantee stability of EKOTON equipment operation in overall picture of sugar plant technology.

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