

New Dewatering Belt Filter Press System

*Juan C. Torres Rivas
MS in Engineering Management
Dr. Hector Cruzado
MEM 6200 Engineering Project Management
Polytechnic University of Puerto Rico*

Abstract – *The new belt filter press that was installed recently will help the company to reduce labor cost, polymer usage as well as improve dewatering process. Actually running an old belt filter press did not help to dewater correctly all materials that arrive to the site. Some of this material need to be processed too many times due to the inefficiency of this belt filter press. Actually and after conduct an internal audit, and a process study, was determined that the lack of process and high labor cost from old press, it was found that the company has lost at least 20 percentages of his dewatering and transferring business, due to can't handle more material that is expected.*

Key Terms – *Dewatering Belt Filter Press, Polymer addition*

NEW DEWATERING BELT FILTER PRESS

This project has the intention to replace an existing old dewatering belt filter press that has been operating for around 22 years. Searching through several engineering designs that specialized in belt filter press design a local designer company found.

Old Dewatering Belt Filter Press System

The old dewatering belt filter press can continue operating, but its operations are higher than expected such as:

- Labor cost is twice (due to need to have two plant operators)
- Polymer consumption is higher (use three times addition of polymer in order to coagulate the material)
- Energy and water consumption is higher
- Gallons processed are less than unusual
- Most of the part has been discontinued
- 85 percent of the process still manually

New belt filter Press

With this new belt filter press, company its able to modify and design new piece of equipment to accommodate current process. This new belt filter press will help the current process to:

- Improve current process
- Reduce polymer use (that has been higher)
- Energy and water reduction
- Labor cost (can operate by one employee only)
- All process will be controlled from a computer automated system

PROJECT PROCESS

Phase I

Phase I was to assess the entire system to ensure all process design is aligned along with the new equipment, few point were observed during the assessment:

- Equipment Startup
- Equipment configuration
- Polymer addition
- Employees OM/PM
- Equipment downtime
- Gallon processed by minute
- Water consumption vs material processed

Using the above mention points, the designer company its able to design the new belt filter press that will align process needs. One of the major problem identified during the design time was, that the company received different materials that need to be dewatered, but there is one material in specific that needs to be treated differently due to its consistency on material.

To ensure the process design its according and accurate to treat this heavy/hard material, that's when Komline – Sanderson, proceed to take a proportional and inconsistent material to run few lab polymer additions and finding out that the percent of TSS and TS are not equal and came with a unique design.

Phase II

Phase II was to bring equipment to the site, and installed as well as request the right permits in order to install this new equipment. Company Project Manager, have to contact the NJDE and PSVC in order to submit a construction permit as well as a new connection permit. Because this new piece of equipment could be subject to new or modify equipment, it was able to request a modification equipment and have the permit approved in 72 hours.

During the equipment installation, there were few issues with the old pipe lines, and some electrical connections that were not assessed previously, making the project to be delayed for 2 more days. Because, the Company has a Certified electrical employee, he was able to install the new three phase panel in order to install the new electrical wiring without interruptions.

Also, during the installation, the Company was able to replace a pipeline and connected to a secondary clarifier in order to use the water in the process. This process will help to reduce completely the use of city water as well as reduce the water flow discharge.

LITERATURE

Komline – Sanderson

Belt filter press is a dewatering equipment that applies mechanical pressure to a mechanically conditioned slurry, which is pressed between two (2) tensioned belts by passing those belts through a serpentine of decreasing diameter rolls.

The machine can actually be divided into three (3) zones: gravity zone, where free draining water is drained by gravity through a porous belt; wedge zone, where the solids are prepared for pressure

application, and pressure zone, where medium, then high pressure is applied to the conditioned solids. Typically, a belt filter press receives a slurry ranging from 1-4% feed solids and produces a final product.

Sebright Product Inc.

This company is also one of the best belt filter press designer approved by EPA, they also have their own patented equipment. Sebright Product along with Komline – Sanderson agree that these type of equipment's are designed according by three (3) zones: gravity, wedge and pressure.

FRC Systems – Wastewater Solutions

Before sludge enters the press, it is chemically conditioned for dewatering with an emulsion polymer flocculants that helps form stronger flocs. After chemical conditioning, a transfer pump drops the sludge onto a preliminary dewatering belt where free water molecules separate by gravity and fall into a collection trough.

As sludge is conveyed along the belt, ploughs roll it around to help water drain out. Before dropping down to the next stage, guide plates position the sludge towards the middle of the belt and ensure nothing is squeezed outside of the filter. A second gravity thickener repeats the process before sludge is fed into a pressing zone.

Upon entering the pressing zone, sludge is sandwiched and squeezed between two belt filters that slowly convey over and under rollers which force excess water out of the sludge and through the filter mesh.

Finally, the pressed sludge is scraped off the belt and collected in a bin. All filtrate and wash water is captured and transferred back to the front of the wastewater system for re-processing.

CONCLUSION

The New Belt Filter Press is able to:

- Reduce downtime repairs
- Polymer addition will be reducing for a significant amount (see chart above)

- City Water consumption has been reduced to a zero
- Labor cost has been cut in a half, due to this equipment can be operated by one employee.

<http://www.sebrightproducts.com/products/bright-technologies/belt-filter-presses>

- [6] Data provide on figure 1 has been provided by Spectraserv Accounting department and is a confidential data.

AUTHOR NOTES

Juan Torres Rivas is a currently enrolled in the Engineering Management Master Degree Program for the Polytechnic University of Puerto Rico as well as was a former student for the BS in Environmental Engineering Program for the same Campus.

Furthermore, Juan Torres Rivas was enrolled and Graduate student from the University of Puerto Rico, Mayaguez Campus, where he obtains a bachelor degree in Civil engineering program from 1997 to 2001.

Mr. Torres Rivas grew up in Ponce, Puerto Rico., where studied all his life until graduated from Academia Cristo Rey. He courses grades from elementary to High school and graduate in 1997. He started his career with Chevron Phillips located in Guayama, Puerto Rico as an environmental engineer from 2001 to 2010.

He started managing small projects such as wastewater treatment plant process improvement, RTO and Solvent recovery installation. .

Portions of this writing, essay, summary or analysis are copies from other writings, online searches' such as definitions or articles that are protected by Copy Rights and will be referred and credited as mentioned.

REFERENCE

- [1] Kerri, Kenneth D. (Author), "Operations of wastewater treatment plants, Vol.1"
- [2] Committee on Toxicants and Pathogens in Bio-solids Applied to Land (Author), Board on Environmental Studies and Toxicology (Author), Division on Earth and Life Studies (Author), National Research Council (Author), "Bio-solids Applied to Land: Advancing Standards and Practices"
- [3] FRC System international – Trusted wastewater Solutions <http://frcsystems.com/belt-filter-press/>
- [4] Komline and Sanderson http://www.komline.com/docs/belt_filter_press.html
- [5] Sebright Products Inc.