Installation of Green Liquor Dregs Filter Press System-An Environmental Friendly And Chemical Recovery Measure.

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Introduction

M/s The Andhra Pradesh Paper Mills Ltd is one of the biggest integrated pulp & paper industries in India. The Mill under Mill Development Plan has implemented environmental friendly and energy efficient state of art technologies during 2004-2007. The Pulp Mill and Soda Recovery units are capable enough to produce 550TPD bleached pulp.

Dregs in green liquor are washed in dregs washer in cauasticizing plant and the same are disposed off. The efficiency of this system is low and need to be strengthened by adding high efficient and suitable washing & dewatering system to discharge the dregs at higher consistency. Trial was conducted with pilot press and found that trial results are encouraging. Trial results are as below:

	Solids in dregs slurry %	Cake dryness	Filtrate clarity, ppm	Filtrate, Na_2O
Average	7.49	42.1	25	62.6

We worked out the scheme installing fully automated dregs filter system to extract residual chemical from dregs slurry and discharge the dregs in the form of cake at 45-50% dryness with residual chemical at 2.5%. It is estimated that good quantity of chemical savings and environment will be improved. Estimated chemical savings with the installation of filter press system is as shown in Table -1.

Dregs Filter Press System.: Filter Press Description

The filter press is a solid liquid separating equipment that works on feed pressure or squeeze pressure to extract water from the slurry and discharge solids in cake form.

The main components of filter press are feed head, filtration elements which includes recessed plates, end plate, zero plate & filter cloth; closing device, plate shifter mechanism, bomb drip tray, power pack etc. It is fully automatic filter press system operated through dedicated PLC.

Filter plates and frames or recessed plates are arranged in parallel and fitted on conventional MS structures. The filter medium is provided in between plates. The filter press is closed with a power operated hydraulic device by pressing moving head with ram, sealing the unit for filtration. Slurry is fed with screw pump through feed nozzle to the chambers formed between plates and the filter medium. leaving the solids trapped inside and the liquid drained out. Once filter press pressure develops 8-9 kg/cm2, feed pump gets stopped automatically. Filtration cycle includes filling, washing, aeration and cake discharge.

TABLE -1

S.No	Particulars	Unit	Value
1	GL Dregs	TPD	6.0
2	Solids in dregs slurry	%	7
3	Dregs slurry as such	TPD	85.7
4		M3/D	82.8
5	Alkali in dregs	Gpl	10
6		Kgs/day	828
7	Chemical loss with dregs (On dry solids basis)	%	2.5
		Kgs/Day	150
8	Moisture in dregs	%	65%
9	Dregs as such	TPD	9.2
10	Chemical loss with dregs on as such basis	Kgs/Day	230
11	Savings in chemical	Kgs/Day	597

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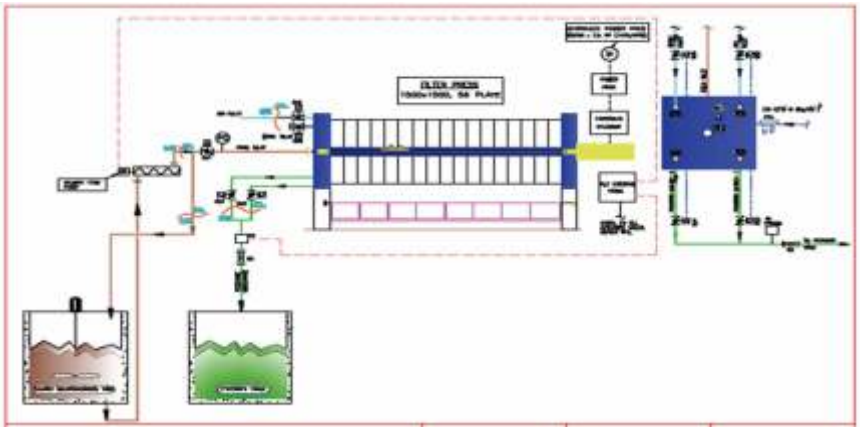
Process description of Green Liquor dregs handling:

Green liquor dregs i.e underflow of G.L dregs washer is pumped to Filter press feed tank as per timer set programme. Dregs slurry from feed tank is fed to filter press which is made ready for cycle of operation by closing in all recessed plates along with filter cloth in tact by hydraulic device at pressure of 200 bar. The liquid from slurry gets separated and collected in filtrate tank. As the pumping is progressing, the solids level in the chambers increases till the chambers are full. Once the filter achieves the pressure of 9 bar, the feed automatically stops. Cake wash with hot water at 65 ^{0}C will follow for about 2- 3 hrs. During the cake wash also, filtration will continue and and filtrate will be collected in filtrate tank. After water wash, the cake is given sufficient airing with compressed air at pressure of 6 bar for about 2 hrs. After completion of airing, Hydraulic pressure is released and closing device is taken out. Bomb drip tray bottom plates will be opened by power pack. By means of plate shifter mechanism, the plates will be separated. The cake between the plates gets loosened and fall by its own weight into the tractor trailer arranged at the bottom of the discharge chute. The solid cake is thus disposed off. The filtrate collected is recycled to the system. Flow sheet of dregs filter press system is ason next page.

Installation and trial run of filter press:

1500 x 1500 MM size fully automatic filter press had been installed in the first week of June,10. Trial runs are in



progress. Filter press is operated in two cycles per day handling all the dregs collected from dregs washer. The objective of trial run is to freeze the best possible filtration cycle and stabilize the operations for achieving set targets of discharge cake dryness at 35% and its residual chemical at 2.5%. Plant is run at the rate of 2 cycles per day. Duration of the trial run is between 3.6.10 14.8.10. Trial runs are conducted varying wash time and airing time of operation cycle for best possible results of cake dryness and residual chemical. Press feed sample is analyzed and the results are as Table - 2.

Details of operation cycle is shown in Table -3

Operation Cycle Table - 3

Table -2

S.No	Description	Unit	Sample -1	Sample -2	Sample -3
1	Dregs	TPD	4.6	5.28	5.0
2	Dregs in slurry	%	8.5	6.5	10.0
3	Alkali in dregs	Gpl	18.5	13.5	22.75
4	Acid insolubles	%	23.5	18.3	21.6
5	Silica as SiO2	%	11.84	8.5	11.2

Table -3

Cycle particulars	Set A	Set B	Set C
Filling in minutes	45	45	45
Hot water wash in minutes	45	60	75
Airing with compressed air in minutes	120	150	180
Cake discharge, minutes	45	45	45
Total, minutes	270	315	360

Table -4

Date	Set No	Discharge cake		Filtrate		Weight of cake disposed/Day	
		Dryness %	Residual chemical, %	Clarity,PPM	Gpl	as such	O.D.basis
7.06.10	Set A	29.5	4.5	16	15.5	15.25	4.5
8.06.10	Set A	29.71	4.39	10	18	15.8	4.7
10.6.10	Set B	31.5	4.33	14	15.5	16.5	5.2
11.6.10	Set B	32.1	5.54	22	18	15.6	5.0
13.6.10	Set C	34.6	3.23	80	12.4	14.0	4.8
14.6.10	Set C	33.2	4.67	54	42.4	14.8	4.9
	Average	31.8	4.51			15.32	4.85

Table-5

Chemical savings of dregs filter press:					
S.No	Particulars	Unit	Sample -1	Sample-2	Sample-3
1	Dregs	TPD	4.6	5.28	5
2	Solid in dregs slurry	%	8.5	6.5	10
3	dregs slurry as such	TPD	54.12	81.23	50.00
4		M3/D	52.04	78.11	48.08
5	Alkali in dregs	gpl	18.5	13.5	20.45
6		kgs/D	962.7	1054.4	983.2
7	Chemical loss with dregs	%	4.7	4.44	4.6
		kgs/D	216.2	234.43	230
8	Moisture in dregs	%	72.7	71.4	67.3
10	Dregs as such	TPD	6.33	7.39	7.43
11	Chemical loss with dregs on as such basis	kgs/D	297.4	328.3	341.8
12	Chemical savings	kgs/D	665.3	726.1	641.4

Results of trial Table - 4

Chemical savings is also worked based on the trial run. Table - 5

Discussion on trial run

1) Cake discharge is within the range of 4.5-5.2 ODTPD and on average 4.85 ODT/D.
2) Average Dryness of discharge cake is 31.8% against estimated dryness of 35%.
3) Average residual chemical as Na_2O is 4.51%.
4) Alkali content in the dregs considered in 10gpl against actual alkali content in dregs of about 13.5-20.45.gpl. This is contributing more residual chemical in the discharge cake.
5) Solids in the slurry is the important factor for the performance of the filter press.
6) Inorganics in discharge cake is 83% which suggests that it can be used in brick industry along with fly ash.
7) Chemical savings worked out is between 665.3-726.1 kgs/day.

Conclusions:

The installation of dregs filter press is justified with the following advantages;

1) The chemical savings due to recycling of the filter press is high which contributes the overall recovery efficiency by 0.28%.
2) It improves environment considerably..
3) As inorganics in dregs are about 83%, It can be explored to utilize the discharge cake along with fly ash in the manufacture of bricks.
4) The trial is for a short span of 6 days. Trials are in progress to stabilize the parameters and operation cycle, which in turn improve dryness of the cake.

Acknowledgement

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