STUDIES ON FULLY AUTOMATIC DECANTER AT SHRI CHHATRAPATI SHAHU SSK LTD., KAGAL (M.S.)

Ankush J. Jagadale[1] , J. A. Chavan[2]

ABSTRACT

In Indian sugar industry decanter technology is successfully proved by performance in all respect at some factories adapting semi automatic decanter machine. At Shri Chhatrapati Shahu S.S.K. Ltd; "Suviron make" total decanter system using three decanters of Alfa Laval make fully automatic decanter model – Sugar Dec 400 with BCC automation were installed in season 2012-13 and results obtained were quiet encouraging which are discussed in this article.

KEYWORDS

Decanter, BCC**,** muddy juice, flocculent, centrate

INTRODUCTION

Shri Chhatrapati Shahu SSK Ltd; is a sugar complex commissioned in the season 1980 with initial capacity of 1250 TCD. Subsequent to gradual plant expansion program presently factory is crushing with average rate including stoppages up to 5000 TCD having 21.5 MW power co-generation and 45 KLPD distillery. The new technologies like cane tumbler, AC-VFD drive for mill, high pressure boilers, modern steam saving devices, FBD for sugar drying, continuous pans , efficient ETP plant and own developed software for sugar factory use etc. are installed and working satisfactorily.

To increase the economical viability of co-generation project, saving of steam is of vital importance. The management was very keen in this subject. In view of achieving bagasse saving in the form of bagacillo and to reduce the losses of sugar through filter cake the factory decided to install fully automatic decanter for mud desweetening. Accordingly total decanter system having capacity 2500 TCD expandable to 5000 TCD initially with three numbers decanter machines model Sugar Dec – 400 with BCC automation were installed. Out of these three machines one no. is for 1st stage, one no. for 2nd stage and one no. as a common standby for 1st or as 2nd stage operation. The supply, erection & commissioning of the total decanter system was completed in October 2012.

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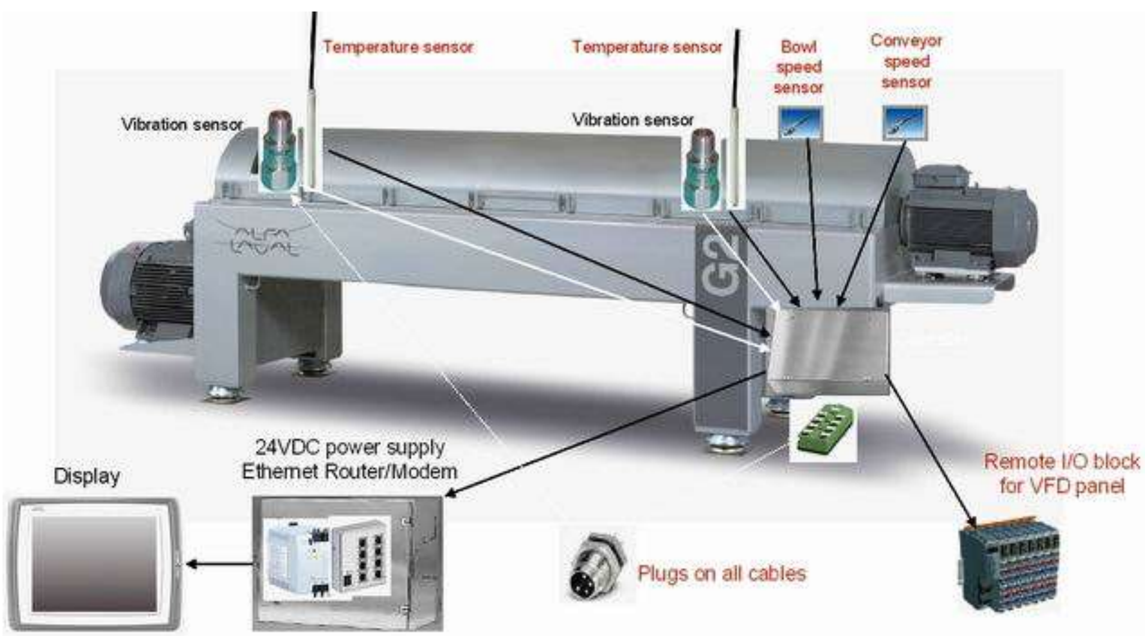
1. Chief Chemist, 2. Chief Engineer,

Shri Chhatrapati Shahu S. S. K. Ltd., Kagal, Kolhapur, (M.S.)
Email: cc@shahusugar.com, ce@shahusugar.com

List of major equipments comprising total decanter system

Sr. no.	Name of equipment	Quantity
1	1st stage Mud receiving tank	01 No.
2	1st Stage muddy juice transfer pumps	02 Nos.
3	Polymer preparation and storage tank	02 Nos.
4	Polymer dosing pumps	04 Nos.
5	1st stage Decanter machine Sugar Dec 400 with BCC automation	01 No.
6	2nd stage Mud receiving tank	01 No.
7	2nd Stage mud slurry conditioner	01 No.
8	2nd Stage mud slurry transfer pumps	02 Nos.
9	2nd stage Decanter machine Sugar Dec 400 with BCC automation	01 Nos.
10	Centrate I flotation clarifier	01 No
11	Centrate I receiving tank	01 No
12	Centrate I transfer pump	02 Nos.
13	Centrate II receiving tank	01 No.
14	Centrate II transfer pumps	02 Nos.
15	Decanter machine - Standby	01 No.
16	Process automation and electrical	1 set
17	Cake conveying system	01 No.
18	Cake discharge bin	01 No.

Total package of BCC automation



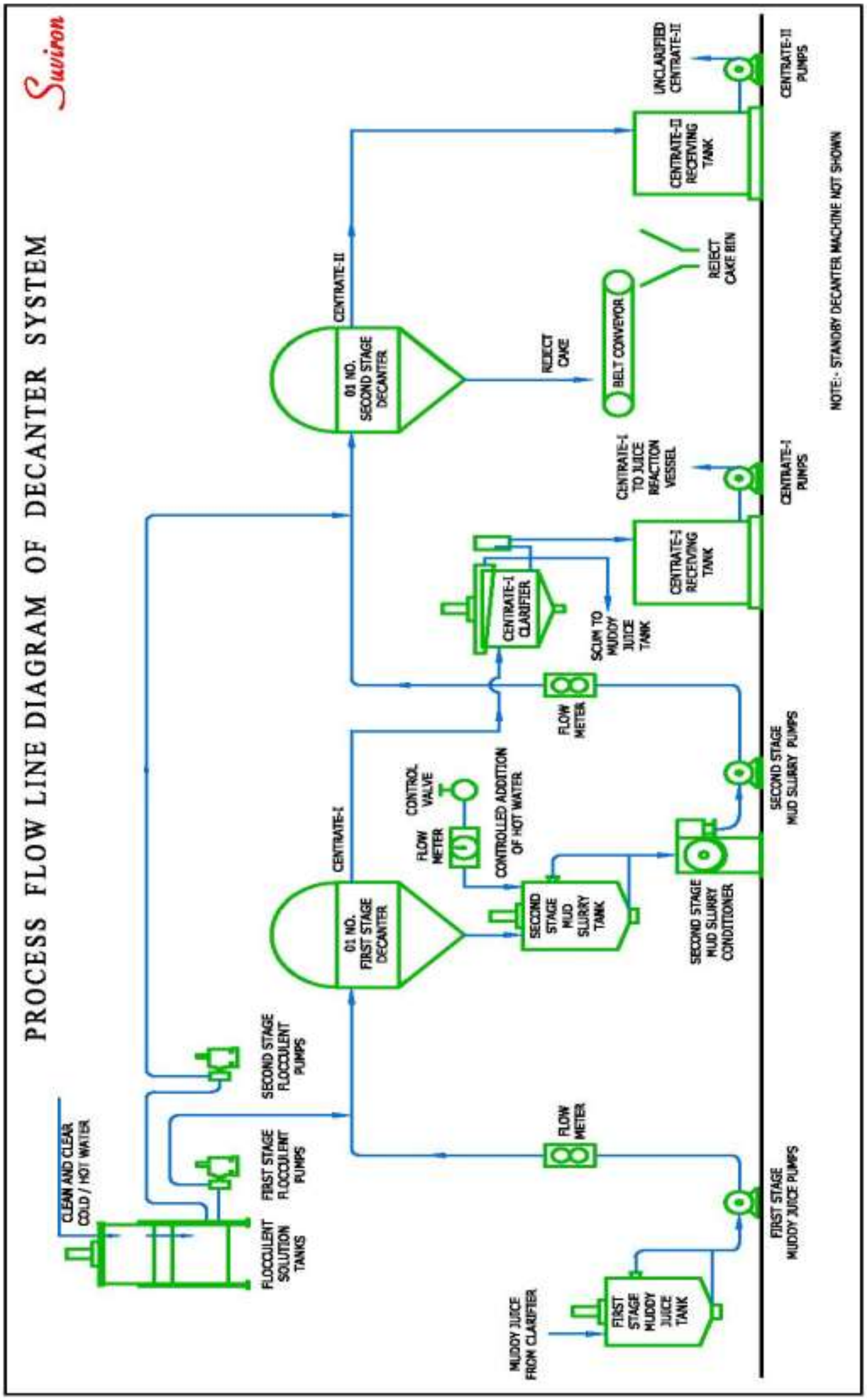
Details of fully automatic decanter machine – Sugar Dec 400 with BCC

Decanters are provided with VFD drive for both drives i.e. main drive and back drive, temperature sensor for bearings, vibration sensor, speed sensor for bowl, speed sensor for conveyor, PLC, HMI etc.

Operating parameters of fully automatic decanter at 5000 TCD

Sr. no.	Parameter	Values	
		First stage	Second stage
1	Flow M3/hr.	24	27
2	Polymer Quantity. LPH	2200	1500
3	Differential speed	24	14
4	Torque (kNm)	0.6	1.1-1.2
5	Main motor Current (Amp.)	53.5	55
6	Back drive current (Amp.)	5.5	8.1
7	Bearing temperature MDE (Deg. C)	82.6	71.9
8	Bearing temperature BDE (Deg. C)	79.3	78.7
9	Vibration (mm/sec.)	2.4 - 4.4	2.0 - 4.0
10	Main drive actual power (kW)	28	26
11	Back drive actual power (kW)	0.1	-2.4
12	Bowl speed (RPM)	3250	3220
13	Dilution water quantity (M3/hr.)	19	
14	Polymer solution concentration (%)	0.075	

Decanter Station at Shri Chhatrapati Shahu SSK Ltd. Kagal


PROCESS FLOW LINE DIAGRAM OF DECANTER SYSTEM
Suviron
CLEAN AND CLEAR COLD / HOT WATER
FLOCCULENT SOLUTION TANKS
FIRST STAGE FLOCCULENT PUMPS
SECOND STAGE FLOCCULENT PUMPS
MUDDY JUICE FROM CLARIFIER
FIRST STAGE MUDDY JUICE TANK
FIRST STAGE MUDDY JUICE PUMPS
FLOW METER
01 NO. FIRST STAGE DECANTER
CENTRATE-I
SECOND STAGE MUD SLURRY TANK
FLOW METER
CONTROL VALVE
CONTROLLED ADDITION OF HOT WATER
SECOND STAGE MUD SLURRY CONDITIONER
SECOND STAGE MUD SLURRY PUMPS
FLOW METER
CENTRATE-I CLARIFIER
SCUM TO MUDDY JUICE TANK
CENTRATE-I RECEIVING TANK
CENTRATE-I TO JUICE REACTION VESSEL
CENTRATE-I PUMPS
01 NO. SECOND STAGE DECANTER
CENTRATE-II
REJECT CAKE
BELT CONVEYOR
REJECT CAKE BIN
CENTRATE-II RECEIVING TANK
UNCLARIFIED CENTRATE-II
CENTRATE-II PUMPS
NOTE:- STANDBY DECANTER MACHINE NOT SHOWN

DATA COLLECTED DURING TWO CRUSHING SEASONS

Sampling and analysis

Methods used for data collection
Method GS7 – 7 - The Determination of the Pol of Filter / Reject Cake by
Method GS7 – 9 -The Determination of Moisture in filter Reject cake by Oven Drying
Method GS7 – 11 - The Determination of the mud solids in juice, Mud and Filter / Reject cake by a Gravimetric method
Method GS7 – 13 (1994) - The Determination of cane fiber in juice, Mud and Filter / Reject cake by filtration method
Lab centrifuge method for Compact Packed Volume (CPV) at 3000 rpm for 3 minutes.

SOLID AND FIBER ANALYSIS

60 samples were collected for analysis over a period of two full crushing seasons and average of the same is tabulated below:

Sr. no.	Sample	Vol/Vol % solids (CPV)	% of w/w solids	% of fiber
01	Mixed juice	8	0.68	0.172
02	Sulphited juice	7.4	0.58	0.164
03	Muddy juice 1	47.8	5.76	1.962
04	Muddy juice 2	37.2	5.44	1.74
05	Centrate 1	2.9	0.304	0.026
06	Centrate 2	1.2	Nil	Nil
07	Clarified centrate	0.32	Nil	Nil
08	Scum from Centrate I clarifier	30.2	3.29	0.14
09	RVF feed	42.8	5.064	2.33
10	RVF filtrate	6.8	0.78	0.136

Average data of Colour analysis conducted from 5th January to 9th January, 2014

Sr. No.	Sample	Colour value (IU)	
		RVF and Decanter in operation	Only Decanter system in operation
1	Sulphited juice	9036	8986
2	Clarified Centrate I	10429	10342
3	RVF filtrate	11757	Only decanter
4	Clear juice Clarifier no. 1	9081	8741
5	Clear juice Clarifier no. 2	8780	8860

PERFORMANCE RESULTS

Sr. no.	Parameters	Value
01	Pol % reject cake	1.4 to 1.6
02	Moisture % reject cake	68 to 70
03	Suspended / insoluble solid removal efficiency across decanter station %	95 to 96
04	Reject cake % cane	2.1 to 2.2

DISCUSSION

A) First stage operation

Clarifier underflow i.e. muddy juice from conventional 4-4-4 clarifier is taken to first stage muddy juice receiving tank provided with stirrer to homogenously mix the muddy juice from all 4 compartments of clarifier.

This preconditioned muddy juice is transferred to first stage Decanter centrifuge through progressive cavity pumps provided with VFD drive. Muddy juice which is going to first stage is measured and indicated by a magnetic flow meter and transmitter installed in the feed line of each machine. At muddy juice entry of decanter machine polymer solution addition connection is provided. The "Anionic" grade polymer is used for improved solid liquid separation at decanter centrifuge.

The decanter machine rotates at 3250 to 3400 rpm AT "G" force more than 2650 G. Machine has one inlet for muddy juice feeding mixed with online addition of polymer solution and has two outlets viz. one for liquid outlet, termed as 'centrate' and another one is for solid discharge i.e. mud cake.

The conveyor of the decanter rotates at slightly lesser speed i.e. differential speed (17 to 22 rpm) than that of the bowl which allows compacting of accumulated solids towards conical end, eventually pushing the solids from discharge ports, in the form of mud cake.

The centrate-I which is coming out from first stage decanter operation before clarification is having brix and purity as like mixed juice and insoluble solids 0.32 % which are half the solids content in mixed juice. This centrate content good amount of air which is adherent to insoluble solid is then fed to Centrate I flotation clarifier. The clear centrate coming out from centrate clarifier with negligible solid content then collected at centrate I receiving tank and pumped to juice reaction vessel. Scum generated in flotation clarifier was sent to 1st stage muddy juice tank. The scum generated at centrate clarifier is discharged to first stage muddy juice receiving tank.

B) Second stage operation

Cake solids discharged from first stage decanter is mixed with hot water in second stage mud slurry preparation tank provided with mechanical stirrer for proper mixing of mud solids with added hot water. For control and proportionate addition of hot water, control valve and magnetic flow mater is provided in hot water pipeline. Mud conditioner is provided at the outlet of second stage mud slurry dilution tank for further conditioning of mud slurry. By using progressive cavity pump this homogeneous mixture of mud slurry is pumped to second stage decanter machines. Magnetic flow meter is installed in the feed line for each machine. At mud slurry entry of decanter machine polymer solution addition connection is provided. The “Anionic” grade polymer is used for improved solid liquid separation at decanter centrifuge.

The reject cake from second stage decanter is having pol % in the range of 1.4 to 1.6 % and moisture percentage in the range of 68 to 70 %.

Centrate generated in second stage operation is having brix 3 to 5 and purity 60 to 65 is collected in centrate-II receiving tank and two nos. centrifugal pumps are provided to transfer centrate normally to juice reaction vessel and as an alternative arrangement piping is provided for recycling the same for mill imbibition which was seldom used.

C) Baggase saving achieved after decanter installation

I) <u>Theoretical approach</u>:

Reference:
<u>Cane Sugar Engineering By: Peter Rain, Page no 251, reproduced below</u>

For better filtration of mud, quantity of baggase added in mud, is 0.5 to 0.7 tons of **dry fiber** per 100 mt of cane.

Let us consider a average value i.e 0.6 tons of dry fiber per100 mt of cane.

Moisture % mill discharged baggase = 48 % i.e. 52 % dry fiber

Required dry fibre is 0.6 MT / 100 MT of cane Crushing.
In terms of required mill discharged bagasse = (0.6 / 52) x 100
= 1.15 MT per 100 MT of cane.

From above reference quantity of bagasse %
cane required to be added at mud mixer of R.V.F. = 1.15 %

Therefore baggase % cane saved = 1.15 %

II) <u>By inferential method</u>

a. Data collected

1.	Reject cake % cane	: 1.9
2.	Moisture % reject cake	: 70
3.	Moisture % baggase at last mill	: 48

b. Data collected at a factory where only R.V.F. is installed in the nearby factories located in the same region

1.	Moisture % filter cake at R.V.F.	: 70
2.	Filter cake % cane	: 3.6

Reduction in cake % cane

1.	Cake % cane using R.V.F. alone	= 3.6
2.	Cake % cane using decanter alone	= 1.9

Therefore reduction in cake % cane = 1.8

<u>Calculations:</u>

The reduction in cake % cane of 1.8 at same moisture level of 70 % as observed after applying decanter technology represents the quantity of bagasse % cane added at mud mixer of R.V.F.

Bagasse saved having moisture content, say @ 48% can be worked out as below

$$= \text{Reduction in cake \% cane} \times \frac{\text{Moisture \% bagasse}}{\text{Moisture \% cake}}$$

$$= 1.8 \times \frac{48}{70}$$

= 1.23 % cane is bagasse saved.

III) <u>By dry solid method</u>

Above results of baggase saving are further substantiated by dry solid method as per following calculations

1. Total dry solids including dry fiber % cane when RVF is used is calcuted below,
   = (Dry matter % filter cake x Filter cake % cane)/ 100
   = 30x3.6/100
   = 1.08 %
2. Total dry solids including dry fiber % cane when decanter is used is calculated below
   = (Dry matter % reject cake x Reject cake % cane)/ 100
   = 30x1.9/100
   = 0.57 %

3. Reduction of dry matter in cake
   % cane after adapting decanter system =1.08 % – 0.57% = 0.51%

From above it is observed that the reduction of dry matter in cake % cane after adapting decanter is due to non addition of baggase which indicates that 0.51 % is the dry matter % cane saved. Considering moisture content of baggase at the last mill is 48 % i.e dry matter of 52 % then the baggase saving achieved is worked out as below,

$$= \frac{\text{Reduction in dry matter \% cane}}{\text{Dry matter \% baggase}} \times 100$$

= 0.51/52x100

= 0.98 % is the baggase saving

Conclusion:

Therefore it could be concluded that after installing decanter in place of R.V.F. the bagasse saving that could be achieved is **1.0 % cane**.

D) How to calculate flow rate of decanter machine –

Generally decanter capacity is expressed in terms of dry solids it can be handled per hour

Solid handling capacity of decanter machine without affecting separation efficiency = 1.5 to 1.6 T/hr.

i.e. 1500 to 1600 Kg dry suspended solid is the solid handling capacity of each decanter machine at first and second stage and feed flow rate accordingly shall vary as per different dry suspended solid % in feed muddy juice / mud slurry.

Flow rate of muddy juice that can be efficiently handled by decanter machine

$$= \frac{\text{Decanter capacity (1.5 T/hr.)} \times 100}{\text{(Suspended solid w/w \%)}}$$

For example:

1) If dry suspended solid in muddy juice = 6%

Feed flow rate of muddy juice that can be efficiently handled by decanter machine

$$= \frac{\text{Decanter capacity (1.5 T/hr.)} \times 100}{\text{(Suspended solid w/w \%)}}$$

$$= \frac{1.5 \times 100}{6.0}$$

= 25 T/hr.

2) If dry suspended solid in muddy juice = 8.5%

Feed flow rate of muddy juice that can be efficiently handled by decanter machine

$$= \frac{\text{Decanter capacity (1.5 T/hr.)} \times 100}{\text{(Suspended solid w/w \%)}}$$

$$= \frac{1.5 \times 100}{8.5}$$

= 17.65 T/hr.

E) Capacity achievement at Decanter station

Initially this system with 1+1 combination of decanter operation was meant to operate for 2500 TCD crushing capacity. However the same fully automatic decanters having BCC control were later subjected to rigorous capacity tests and it is found that this fully automatic decanter model with BCC control was capable to handle muddy juice corresponding to 5000 TCD without harming performance results.

Subsequent to establishing decanter capacity of existing setup being already adequate for 5000 TCD, the ultimate plant capacity desired to be achieved in phased out expansion program, it is now concluded that no additional decanter is required to be added. Only minor changes in muddy juice / mud slurry pumps, pipe and pipe fittings shall be carried out for the current season to operate at 5000 TCD capacity.

F) Insoluble / Suspended solid separation efficiency

Insoluble / Suspended solid separation efficiency varies with respect to muddy juice flow, concentration of suspended solid in muddy juice, differential speed of bowl and conveyor, pond level inside the decanter bowl, conditioning of muddy juice, polymer dosage, temperature of muddy juice, temperature of dilution water and stabilized flow. Referring to table no. 1 it would be observed that solid separation efficiency measured across entire decanter station varies between 93 to 96 %

G) Factors affecting reject cake pol

a) Quantity, quality and temperature of dilution water used
b) Use of settling polymer at juice clarifier
c) Quantity of baggase present in muddy juice
d) Pol % cane
e) Use settling polymer at decanter
f) Flow of muddy juice / mud slurry to decanter

H) Advantages

1. Bagacillo saving @ 1% on cane
2. Less sugar loss through final reject cake
3. Less quantity of reject cake hence reduction in transportation cost
4. Higher suspended solid removal efficiency across each decanter – 95 to 96 %.
5. Less moisture of reject cake i.e. 68 to 70 %
6. Less power consumption as compared to RVF
7. Compact layout
8. Easy for operation as system is fully automatic
9. Heat energy saving as system is totally closed

I) Polymer requirement

Settling polymer required in conventional clarifier at 2 to 3 hr. retention time is 0.5 to 1 ppm and in case of SRTC at retention time 1 hr. is 3 to 4 ppm. While at decanter where separation takes place only in a few seconds the requirmen of polymer in the range of 10 to 11 ppm on cane appears to be quite logical.

Centrate I from decanter

Reject cake falling into bin

CONCLUSION

- One decanter of model Sugar Dec 400 with BCC automation can handle 1500 to 1600 kg of dry solids per hour which corresponds to decanter station capacity suitable for 5000 TCD crushing rate.
- The colour of RVF filtrate returns was always found more than that of clarified centrate hence during next crushing season both the **clarified** centrates shall be taken to process after providing a separate flotation clarifier for centrate II as well. Presently the clarified centrate I is already being regularly taken to juice reaction vessel.

ACKNOWLEDGEMENT

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M/s.Shri Chatrapati Shahu S. S. K. Ltd, Kagal, Kolhapur

Decanter System for muddy juice treatment

Daily Report

Decanter Model :- SugarDec- 400 (4.5 Kn-M, Main motor - 30 kW, Back drive motor: 11.5 kW, with BCC)

Make:- Alfa Laval Ind. Ltd., Pune

Date - 11/12/2014 Crushing:- 5030 TONS

SHIFT 4 /12

Sr. no.	Time	First stage flow (Cu. M): 1st stage Decanter	Standby machine		2nd stage flow (Cu. M): 2nd stage Decanter	Hot water	Centrate II to mJ	Polymer	vacuum filter in operation: no. 1 8x16	no. 2 8x16	no. 3 10 X 20
1	4.0-5.0	15.2	–	–	14.8	10.2	13.4	11 Kgs	X	✓	✓
2	5.0-6.0	14.8	–	–	15.8	10.3	13.5		X	✓	✓
3	6.0-7.0	15.1	–	–	15	10.2	13.3		X	✓	✓
4	7.0-8.0	14.8	–	–	14.7	10.1	13.1		X	✓	✓
5	8.0-9.0	15	–	–	14.9	10.2	13.5		X	✓	✓
6	9.0-10.0	18.2	–	–	18.8	11.1	13.5		X	✓	✓
7	10.0-11.0	19.2	–	–	20.2	14	14.7		X	✓	✓
8	11.0-12.0	19.0	–	–	20.1	14.4	14.9		X	✓	✓
Total		131.4	0	0	133.4	90.5	109.9				

SHIFT 12/8

Sr. no.	Time	First stage flow (Cu. M): 1st stage Decanter	Standby machine		2nd stage flow (Cu. M): 2nd stage Decanter	Hot water	Centrate II to mJ	Polymer	vacuum filter in operation: no. 1 8x16	no. 2 8x16	no. 3 10 x 20
1	12.0-1.0	19.1	–	–	19.6	12.8	17.6	12 Kgs	X	✓	✓
2	1.0-2.0	19.2	–	–	19.7	12.8	17.6		X	✓	✓
3	2.0-3.0	19.0	–	–	19.5	12.7	17.5		X	✓	✓
4	3.0-4.0	19.2	–	–	19.4	12.9	17.2		X	X	✓
5	4.0-5.0	19.2	–	–	19.5	12.9	16.6		X	X	✓
6	5.0-6.0	20.9	–	–	20.5	12.7	16.6		X	X	✓
7	6.0-7.0	20.9	–	–	20.0	12.6	16.7		X	X	✓
8	7.0-8.0	22.5	–	–	22.5	15.3	18.3		X	X	✓
Total		160	0	0	160	104.7	138.1				

SHIFT 8/4

Sr. no.	Time	First stage flow (Cu. M): 1st stage Decanter	Standby machine		2nd stage flow (Cu. M): 2nd stage Decanter	Hot water	Centrate II to mJ	Polymer	vacuum filter in operation: no. 1 8x16	no. 2 8x16	no. 3 10 x 20
1	8.0-9.0	24	–	–	25	13.6	17.7	12 Kgs	X	X	✓
2	9.0-10.0	25.2	–	–	25.3	13.7	17.3		X	X	✓
3	10.0-11.0	26.1	–	–	23.2	13.5	19.8		X	X	✓
4	11.0-12.0	24.3	–	–	23.4	14.6	19.7		X	X	✓
5	12.0-1.0	24.1	–	–	24.4	15.7	22.1		X	X	✓
6	1.0-2.0	23.6	–	–	26.5	17.5	21.9		X	X	✓
7	2.0-3.0	21.0	–	–	24.8	18	22.1		X	X	✓
8	3.0-4.0	22.0	–	–	25.0	18.0	29.8		X	X	✓
Total		186.4	0	0	194.9	125.4	169				

Results

SHIFT 4 / 12

	Brix	Pol	Purity	pH
Centrate I	15.96	14.27	89.41	
Centrate II	5.01	3.52	70.26	

	Pol	Moisture
Ist cake	–	–
Final cake	1.7	69.00%

SHIFT 12/8

	Brix	Pol	Purity	pH
Centrate I	16.01	14.27	89.13	
CentrateII	4.99	3.51	70.34	

	Pol	Moisture
Ist cake	–	–
Final cake	1.7	69

SHIFT 8/4

	Brix	Pol	Purity	pH
Centrate I	16.14	14.34	88.52	
CentrateII	5.18	3.68	71.04	

	Pol	Moisture
Ist cake	–	–
Final cake	1.8	70

TOTAL FINAL CAKE 146.00 Ton

Crushing	5030.00 Ton
Crushing on RVF	2000.00 Ton
Crushing on Decanter	3030.00 Ton
Filter Cake % cane in case RVF	3.80 % cane
Filter Cake qty. from RVF	76.00 Ton
Filter cake qty. from Decanter	70.00 Ton
Filter Cake % in case of Decanter	2.30 % cane
TOTAL FINAL CAKE	146 Ton

Decanter system Make : Suviron Equipments Pvt. Ltd., Ahmednagar

Suspendede solid analysis

Sr. no.	Description	% w/w solids
	SHIFT 4 / 12	
1	Muddy juice	5.5
2	Centrate I (Decanter Machine outlet)	0.25
3	Centrate I (Centrate clarifier outlet)	Nil
4	2nd Stage feed	4.80
5	Centrate II	0.75
	SHIFT 12/8	
1	Muddy juice	5.00
2	Centrate I (Decanter Machine outlet)	0.1
3	Centrate I (Centrate clarifier outlet)	Nil
4	2nd Stage feed	4.45
5	Centrate II	0.55
	SHIFT 8/4	
1	Muddy juice	5.45
2	Centrate I (Decanter Machine outlet)	0.2
3	Centrate I (Centrate clarifier outlet)	Nil
4	2nd Stage feed	4.87
5	Centrate II	0.67
	Average	
1	Muddy juice	5.32
2	Centrate I (Decanter Machine outlet)	0.18
3	Centrate I (Centrate clarifier outlet)	Nil
4	2nd Stage feed	4.72
5	Centrate II	0.62

Analysis Method used - ICUMSA Method GS7-11 for the Determination of Mud solids in Juice , Mud and Filter Cake by a Gravimetric Method - Accepted

Dinesh Deo 14/02

For M/s.Alfa Laval India Ltd.Pune

Gokulname

S. 14/02 Phanikrishna

14/02/2014

(Arvind Giramkar)

For M/s. Suviron Equipment Pvt. Ltd., Ahmednagar

14/02/14 (Autade Amol)

For M/s.Shri Chatrapati S. S. S. K. Ltd, Kagal

CC

OE

M/s.Shri Chatrapati Shahu S. S. K. Ltd, Kagal, Kolhapur

Decanter System for muddy juice treatment

Daily Report

Decanter Model :- SugarDec- 400 (4.5 Kn-M, Main motor - 30 kW, Back drive motor: 11.5 kW, with BCC)

Make:- Alfa Laval Ind. Ltd., Pune

Date- 12/02/2014 Crushing- 5030 TONS

SHIFT 4 /12

Sr. no.	Time	First stage flow (Cu. M): 1st stage Decanter	Standby machine		2nd stage flow (Cu. M): 2nd stage Decanter	Hot water	Centrate II in m3	Polymer	Vacuum filter in operation: no. 1 8x15	no. 2 8x16	no. 3 10 X 21
1	4.0-5.0	20.1	–	–	19.9	15.1	10.8	20 Kgs	X	X	X
2	5.0-6.0	–	–	–	–	–	–		X	X	X
3	6.0-7.0	–	–	–	–	–	–		X	X	X
4	7.0-8.0	–	–	–	–	–	–		X	X	X
5	8.0-9.0	–	–	–	–	–	–		X	X	X
6	9.0-10.0	25.0	–	–	20.0	18	22		X	X	X
7	10.0-11.0	25.0	–	–	26.0	17.7	23.9		X	X	X
8	11.0-12.0	25.0	–	–	26.0	17.5	25.9		X	X	X
Total		75.0	0	0	76.0	59.2	69.8				

SHIFT 12/8

Sr. no.	Time	First stage flow (Cu. M): 1st stage Decanter	Standby machine		2nd stage flow (Cu. M): 2nd stage Decanter	Hot water	Centrate II in m3	Polymer	Vacuum filter in operation: no. 1 8x15	no. 2 8x16	no. 3 10 x 21
1	12.0-1.0	24	–	–	23	17	13.5	20 Kgs	X	X	X
2	1.0-2.0	24	–	–	23	17	20		X	X	X
3	2.0-3.0	30.0	–	–	26	18	23		X	X	X
4	3.0-4.0	30.0	–	–	26	18	23		X	X	X
5	4.0-5.0	20.0	–	–	26.6	17.8	23		X	X	X
6	5.0-6.0	26.2	–	–	26.0	18	23		X	X	X
7	6.0-7.0	26.2	–	–	26.0	18	22		X	X	X
8	7.0-8.0	26.1	–	–	26.5	17.5	23.0		X	X	X
Total		204.5	0.0	0.0	204.1	141.3	169.5				

SHIFT 8/4

Sr. no.	Time	First stage flow (Cu. M): 1st stage Decanter	Standby machine		2nd stage flow (Cu. M): 2nd stage Decanter	Hot water	Centrate II in m3	Polymer	Vacuum filter in operation: no. 1 8x15	no. 2 8x16	no. 3 10 x 21
1	8.0-9.0	26	–	–	28	17	24.6	20 Kgs	X	X	X
2	9.0-10.0	27	–	–	28	17.7	23		X	X	X
3	10.0-11.0	28	–	–	29	18	24		X	X	X
4	11.0-12.0	27	–	–	29	18.7	24		X	X	X
5	12.0-1.0	28	–	–	29	18.6	23		X	X	X
6	1.0-2.0	27.0	–	–	28.0	18.9	23		X	X	X
7	2.0-3.0	28.0	–	–	28.0	18.5	23		X	X	X
8	3.0-4.0	28.0	–	–	29.0	18.7	22.0		X	X	X
Total		219.0	0	0	228.0	146.1	186.6				

Results

SHIFT 4 / 12

	Brix	Pol	Purity	pH
Centrate I	16.01	14.27	89.13	
Centrate II	5.11	3.59	70.25	

	Pol	Moisture
Ist cake	–	–
Final cake	1.7	68.00%

SHIFT 12/8

	Brix	Pol	Purity	pH
Centrate I	16.14	14.35	88.92	
Centrate II	5.18	3.68	71.04	

	Pol	Moisture
Ist cake	–	–
Final cake	1.7	69

SHIFT 8/4

	Brix	Pol	Purity	pH
Centrate I				
Centrate II				

	Pol	Moisture
Ist cake	–	–
Final cake	1.8	70

TOTAL FINAL CAKE 125.00 Ton

Crushing	5030.00 Ton
Crushing on RVF	0.00 Ton
Crushing on Decanter	5030.00 Ton
Filter Cake % cane in case RVF	0.00 % cane
Filter Cake qty. from RVF	0.00 Ton
Filter cake qty. from Decanter	125.00 Ton
Filter Cake % in case of Decanter	2.50 % cane
TOTAL FINAL CAKE	125 Ton

Decanter system Make : Suviron Equipments Pvt. Ltd., Ahmednagar

Suspendede solid analysis

Sr. no.	Description	% w/w solids
	SHIFT 4 / 12	
1	Muddy juice	5.86
2	Centrate I (Decanter Machine outlet)	0.2
3	Centrate I (Centrate clarifier outlet)	Nil
4	2nd Stage feed	8.2
5	Centrate II	0.47
	SHIFT 12/8	
1	Muddy juice	5.24
2	Centrate I (Decanter Machine outlet)	0.12
3	Centrate I (Centrate clarifier outlet)	Nil
4	2nd Stage feed	4.75
5	Centrate II	0.55
	SHIFT 8/4	
1	Muddy juice	5.45
2	Centrate I (Decanter Machine outlet)	0.21
3	Centrate I (Centrate clarifier outlet)	Nil
4	2nd Stage feed	4.87
5	Centrate II	0.69
	Average	
1	Muddy juice	5.51
2	Centrate I (Decanter Machine outlet)	0.17
3	Centrate I (Centrate clarifier outlet)	Nil
4	2nd Stage feed	4.95
5	Centrate II	0.57

Analysis Method used - ICUMSA Method GS7-11 for the Determination of Mud solids in Juice , Mud and Filter Cake by a Gravimetric Method - Accepted

Dinesh Rao 14/02

For M/s Alfa Laval India Ltd Pune

Gaurav Mane

Hari Krishna

(Arvind Giramkar) 14/02/2014

For M/s. Suviron Equipments Pvt. Ltd. Ahmednagar

14/02/14

(Autade Amol)

For M/s.Shri Chatrapati S. S. S. K. Ltd, Kagal

M/s.Shri Chatrapati Shahu S. S. K. Ltd, Kagal, Kolhapur

Decanter System for muddy juice treatment

Daily Report

Decanter Model :- SugarDec- 400 (4.5 Kn-M, Main motor - 30 kW, Back drive motor: 11.5 kW, with BCC)

Make:- Alfa Laval Ind. Ltd., Pune

Date:- 13/02/2014 Crushing:- 4830 TONS

SHIFT 4 /12

Sr. no.	Time	First stage flow (Cu. M) 1st stage Decanter	Standby machine		2nd stage flow (Cu. M) 2nd stage Decanter	Hot water	Centrate II to mill	Polymer	vacuum filter in operation no. 1 8x16	no. 2 8x16	no. 3 10 X 20
1	4.0-5.0	24.5	--	--	27.5	18	24.5	18 Kgs	X	X	X
2	5.0-6.0	24.5	--	--	26	18	24.5		X	X	X
3	6.0-7.0	24.5	--	--	26.5	18	24.6		X	X	X
4	7.0-8.0	24.5	--	--	27.5	18	23.9		X	X	X
5	8.0-9.0	24.5	--	--	26.5	18	24		X	X	X
6	9.0-10.0	24.5	--	--	27.0	18	23		X	X	X
7	10.0-11.0	24.5	--	--	27.0	18	22		X	X	X
8	11.0-12.0	24.5	--	--	27.0	18	22		X	X	X
Total		196	0	0	215	144	188.5				

SHIFT 12/8

Sr. no.	Time	First stage flow (Cu. M) 1st stage Decanter	Standby machine		2nd stage flow (Cu. M) 2nd stage Decanter	Hot water	Centrate II to mill	Polymer	vacuum filter in operation no. 1 8x16	no. 2 8x16	no. 3 10 x 20
1	12.0-1.0	28	--	--	25.5	21.5	24	19 Kgs	X	X	X
2	1.0-2.0	27	--	--	26	22	24		X	X	X
3	2.0-3.0	28.0	--	--	25.5	22	25		X	X	X
4	3.0-4.0	28.0	--	--	26	22	24		X	X	X
5	4.0-5.0	28.0	--	--	27.2	21	23		X	X	X
6	5.0-6.0	28.0	--	--	26.0	21	23		X	X	X
7	6.0-7.0	27.0	--	--	26.0	23	25		X	X	X
8	7.0-8.0	28.0	--	--	26.0	22.0	23.0		X	X	X
Total		272	0	0	403	174.5	191				

SHIFT 8/4

Sr. no.	Time	First stage flow (Cu. M) 1st stage Decanter	Standby machine		2nd stage flow (Cu. M) 2nd stage Decanter	Hot water	Centrate II to mill	Polymer	vacuum filter in operation no. 1 8x16	no. 2 8x16	no. 3 10 x 20
1	8.0-9.0	29	--	--	30	21	24.6	19 Kgs	X	X	X
2	9.0-10.0	30	--	--	30	23	25		X	X	X
3	10.0-11.0	30	--	--	32	22.0	25		X	X	X
4	11.0-12.0	29	--	--	31	22	24		X	X	X
5	12.0-1.0	31	--	--	32	22	24		X	X	X
6	1.0-2.0	29.0	--	--	33.0	22	25		X	X	X
7	2.0-3.0	28.0	--	--	28.0	23	25		X	X	X
8	3.0-4.0	29.0	--	--	31.0	23.0	22.0		X	X	X
Total		235	0	0	247	178	194.6				

Results

SHIFT 4 / 12

	Brix	Pol	Purity	pH
Centrate I	17.96	15.31	85.24	6.5
Centrate II	4.83	3.61	74.74	6.1

	Pol	Moisture
Ist cake	--	--
Final cake	1.7	69.00%

SHIFT 12/8

	Brix	Pol	Purity	pH
Centrate I	16.42	14.73	89.71	6.7
CentrateII	5.31	3.68	69.58	6.3

	Pol	Moisture
Ist cake	--	--
Final cake	1.7	69

SHIFT 8/4

	Brix	Pol	Purity	pH
Centrate I	--	--	--	
CentrateII	--	--	--	

	Pol	Moisture
Ist cake	--	--
Final cake	1.8	70

TOTAL FINAL CAKE 105.70 Ton

Crushing	4830.00 Ton
Crushing on RVF	0.00 Ton
Crushing on Decanter	4830.00 Ton
Filter Cake % cane in case RVF	0.00 % cane
Filter Cake qty. from RVF	0.00 Ton
Filter cake qty. from Decanter	105.70 Ton
Filter Cake % in case of Decanter	2.19 % cane
TOTAL FINAL CAKE	**105.7 Ton**

Decanter system Make : Suviron Equipments Pvt. Ltd. Ahmednagar

Suspendede solid analysis

Sr. no.	Description	% w/w solids
	SHIFT 4 / 12	
1	Muddy juice	5.75
2	Centrate I (Decanter Machine outlet)	0.15
3	Centrate I (Centrate clarifier outlet)	Nil
4	2nd Stage feed	4.32
5	Centrate II	0.59
	SHIFT 12/8	
1	Muddy juice	5.411
2	Centrate I (Decanter Machine outlet)	0.15
3	Centrate I (Centrate clarifier outlet)	Nil
4	2nd Stage feed	3.89
5	Centrate II	0.65
	SHIFT 8/4	
1	Muddy juice	5.45
2	Centrate I (Decanter Machine outlet)	0.18
3	Centrate I (Centrate clarifier outlet)	Nil
4	2nd Stage feed	5.2
5	Centrate II	0.64
	Average	
1	Muddy juice	5.53
2	Centrate I (Decanter Machine outlet)	0.16
3	Centrate I (Centrate clarifier outlet)	Nil
4	2nd Stage feed	4.47
5	Centrate II	0.62

Analysis Method used - ICUMSA Method GS7-11 for the Determination of Mud solids in Juice , Mud and Filter Cake by a Gravimetric Method - Accepted

Dinesh Dev 14/02

For M/s Alfa Laval India Ltd Pune

Gorakh Mane

14/02/2014

[Arvind Gramopa]

For M/s. Suviron Equipment Pvt. Ltd., Ahmednagar

14/02/14 (Aatade Amol)

For M/s Shri Chatrapati S. S. S. K. Ltd. Kagal