

Subject: Innovative design & developments in rotary positive displacement screw pump for lifting “A” Mascuite.

Innovative combine development for ‘A’ Mascuite NETZSCH screw pump at Pandurang Sugar, first time in India.

Background:

In cane Sugar industry there is vast scope for reducing maintenance and operation cost, power saving and improving quality of sugar. In this way only we can sustain economically in this sugar industry.

All of us having non-gravity plants use Rota pump for lifting ‘A’ Mascuite from crystallizer to ‘A’ centrifugal machine pug mill. Due to application of Rota pump sugar crystal damages are more resulting in dust formation and recirculation of sugar material. Also it affects on uniform sugar crystal and its size. Further the sugar house working environment always remains polluted and hazards. Ultimately it reduces sugar price due to dusty and non-uniform sugar crystal.

Nobody were daring to use screw pump for lifting ‘A’ Mascuite as its purity is very high and material settles down and become very hard in case of pump failure. Use of advanced automation and other technical remedies was real solution to overcome this problem.

Necessity of rotary positive displacement screw pump instead of Rota pump

All of us having non gravity sugar plants are using Rota pump to convey “A” mascuite from “A” crystallizer to “A” batch machine pug mill.

Disadvantages of Rota pumps

- ▶ More maintenance cost due to more wear and tear of rotating parts
- ▶ Mascuite leakages through shaft sealing
- ▶ Consuming more electric power (more than twice)
- ▶ More Crystal Damage & Dust formation
- ▶ Recirculation of sugar
- ▶ Polluted & Dusty working environment
- ▶ Obstacle in getting uniform sugar crystal and its size
- ▶ Noise & Sound Pollution
- ▶ Reduces Sugar price due to dusty and non-uniform crystal sugar

Innovative Designing & development steps of new NETZSCH pump for 'A' Mascuite

Considering disadvantages of Rota pump, NETZSCH pump team and Pandurang Sugar technical team, under able guidance of Shree Yashwant Kulkarni Managing director, unitedly decided to develop a best quality and proven technology “**Rotary Positive Displacement Screw Pump**” to overcome the Rota pump disadvantages.

After long meetings, discussions for removing Errors and Difficulties this new pump was designed with proper automation for using it to lift 'A' Mascuite without any disturbance. Role of automation for control and smooth performance was very important.

Pandurang Sugar given an opportunity to develop and supply this pump on trial basis and it was decided that after proven performance and trial for more than two weeks Pandurang Sugar will place purchase order. In India, such type of screw pump was first time designed and used for 'A' mascuite successfully.

For the discussion & inspection of the pump Pandurang Sugar technical officers & M.D Saheb visited to NETZSCH technology at their works at Verna industrial estate Goa. Length of pump-18 ft, weight of pump- 2 MT

This German make NETZSCH pumps are widely used all over world in Europe, Brazil, Thailand, and Indonesia for B, C, and A Molasses and for B & C mascuites.

'A' Mascuite Screw Pump Specification's

- ▶ Capacity- 75 m³/Hr, Pump Head- 12 to 15 Mtrs.
- ▶ Application- 'A' Mascuite lifting, Make- NETZSCH
- ▶ Temp of 'A' Mascuite - 60⁰ c to+ - 5⁰ c , Bricks -90 to 93⁰
- ▶ Viscosity- 20000 cps
- ▶ Motor- 30 KW

Automation for Smooth and Safe Operation

- ▶ Pump Motor is driven by AC VFD
- ▶ PID controller used to control motor speed
- ▶ Ultrasonic level transmitter fitted to know suction gutter level
- ▶ Alarm system used for low level of crystallizer gutter (40%) detection
- ▶ We have made provision of low level alarm at which pump RPM should be minimum (20%) to avoid cavitation and safeguard of stator
- ▶ We have provided temperature sensor to detect stator temperature, as temperature reaches to set point (70⁰ c), Temperature controller cuts the signal fed to VFD and in turn VFD stops and safeguards the stator to avoid dry run
- ▶ We have provided pneumatic actuated gate to maintain gutter level automatically by using PID control
- ▶ Hot water connection provided to avoid pump chocking and stator damage
- ▶ Provided 2 ½” – 2 nos. drain plug
- ▶ Logic- As level of crystallizer gutter reduces motor RPM reduces, as gutter level reaches to set point motor RPM should be increased proportionally



Picture- Shree Pandurang S.S.K Ltd, Shreepur

Benefits of Netzsch PCP- NM148SY02S08J against ROTA pump

1) Power Saving:

- i) 1 No of Netzsch NEMO NM148SY02S08J (15 KW-18 KW) replaced 2 No's of ROTA pumps with total absorbed power of 40 KW (Installed power 22 KW each 2 Motors) of ROTA pumps & total power saving of around 22-25 KW
- ii) Per season power saving- 1, 00,000 units.

2) Crystal Damage:

- i) Crystal Damage reduced by 20-25 % (Dust collection)
- ii) Better crystal quality which enhanced uniform Sugar crystal
- iii) Sugar dust free, Clean & Non-Hazardous working environment
- iv) We can get minimum Rs.3 to 5/- more per quintal of sugar

3) Smooth & Noise Free Operation:

- i) Noise Free Operation with Non Pulsating Continuous un-interrupted smooth flow

4) Leakage & Wastage Free:

- i) Leakage free pump operation from Shaft sealing saving high purity "A" Masseccuite

5) Automated Control System:

- i) Ultrasonic level sensor control to maintain suction level and to avoid pump cavitation
- ii) Dry Run Protection to avoid stator dry running

6) Reduction in Maintenance cost

- i) Stator life is long

Observation:

Sr. No	Flow (m ³ /Hr)	Flow (TPH)	Diff. Pressure (Bar)	Frequency (Hz)	RPM	Power Consumption (KW)
1	70	102	1.5	50	91	18
2	64	93	1.5	45	82	16
3	36	81	1.5	40	73	15
4	49	71	1.5	35	64	15
5	43	62	1.5	30	55	14

Thus this rotary positive displacement screw pump technology of NETZSCH has become proven and beneficial to survive sugar industry.

I am very much thankful to our honorable chairman Shri Sudhakar Pant Paricharak saheb and managing director Shri Yashwant Kulkarni Saheb along with board of directors of Shree **Pandurang S.S.K Ltd. Shreepur** for encouraging me to publish this paper in the DSTI convention 2019.

Thanking you,

Yours Faithfully

R B Patil

Works Manager

Shree Pandurang SSK Ltd