



WEL COME

DSTA- Sugar Seminar

On 1st & 2nd Oct 2019

Venue:

Hotel Hyatt Regency, Nagar road, Pune

PAPER ON-

" Innovative design & developments in rotary positive displacement screw pump for lifting "A" Mascuite "

Innovative combine development for 'A' Mascuite by NETZSCH Pump at Pandurang Sugar, first time in India

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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 of the pump
- ▶ More wear and tear of rotating parts of pumps
- ▶ More mascuite leakages through shaft sealing
- ▶ Consuming more electric power (more than twice)
- ▶ More Crystal Damage
- ▶ More Dust formation
- ▶ 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.

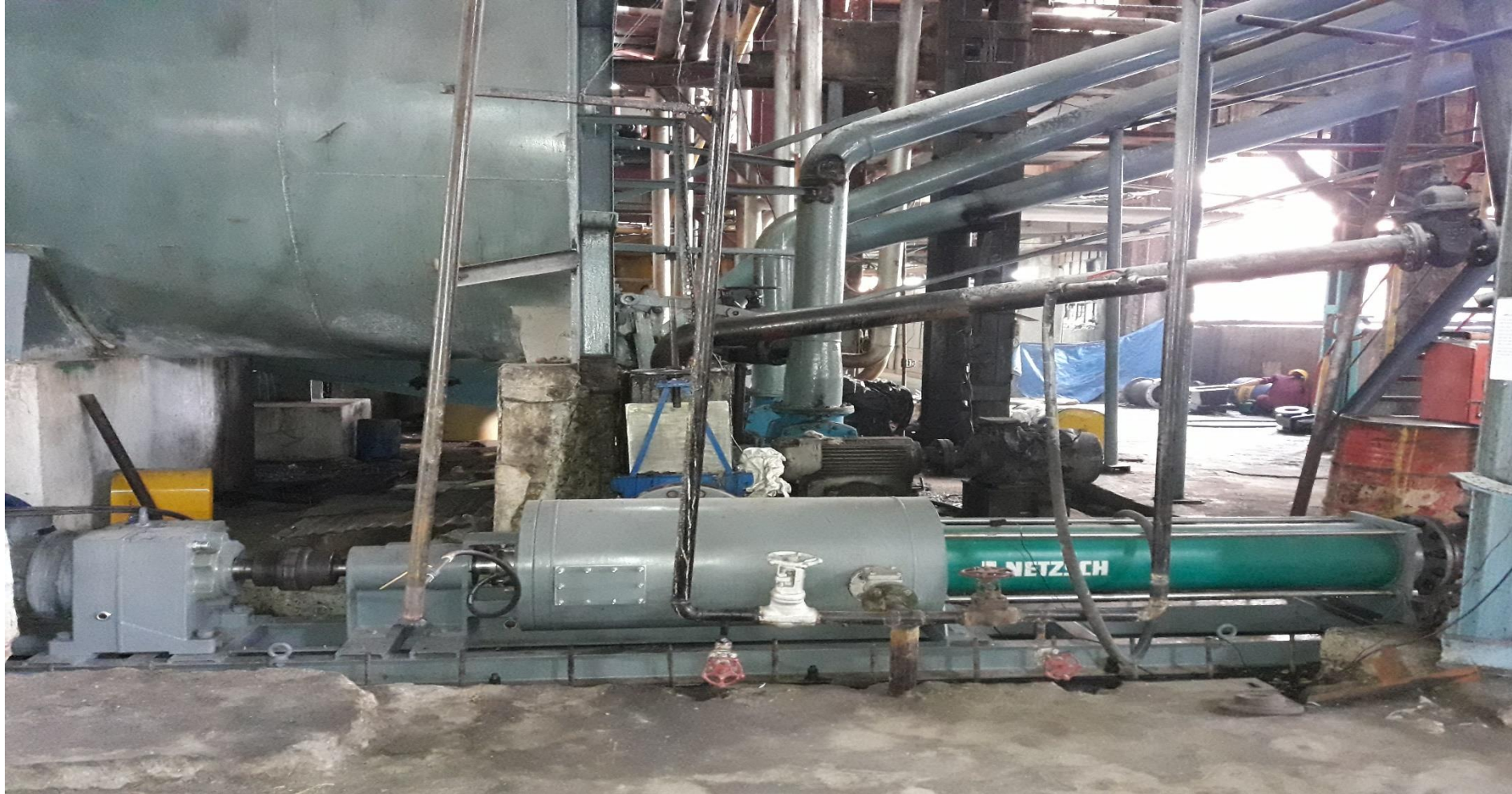
Length of pump-18 ft, weight of pump- 2 MT

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

'A' Mascuite Screw Pump Specification's

- ▶ Capacity- 75 m³/Hr
- ▶ Make- NETZSCH
- ▶ Pump Head- 12 to 15 Mtrs.
- ▶ Temp of 'A' Mesquite- 60⁰ c to+ - 5⁰ c
- ▶ Bricks of 'A' Mesquite- 90 to 93⁰
- ▶ Viscosity- 1,50,000 cps
- ▶ Motor- 30 KW
- ▶ Length of pump-18 ft,
- ▶ weight of pump- 2 MT

NETZSCH Pump : NM148SY02S08J



NEMO Pump Model NM148SY02S08J with Accessories and Instruments
Length of pump-18 ft,

Process Automation :



- ▶ Installed an Ultrasonic Level Sensor in Pump gutter line, to keep check on Massicuite Level to avoid Pump Cavitation.
- ▶ Level Controller gives signal of low gutter level to VFD which reduced Pump RPM, and gives an Alarm signal to open doors of crystallizer.
- ▶ Once required level is achieved Pump ramps-up its RPM and gives required flow.
- ▶ Dry Run Protection is installed to avoid any Dry running w/o any bypass arrangement.

Benefits of using NETZSCH Pump

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 provided pneumatic actuated gate to maintain gutter level automatically by using PID control.
- ▶ 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.
- ▶ Hot water connection provided to avoid pump chocking and stator damage.
- ▶ Provided 2 ½” - 2 nos. drain plug to drain masscuite in case of power failure.
- ▶ Logic- As level of crystallizer gutter reduces motor RPM reduces, as gutter level reaches to set point motor RPM should be increased proportionally.

Advantages of NETZSCH PCP-NM148SY02S08J against ROTA Pump

1) Power Saving: (60%)

- ▶ 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 20-22 KW
- ▶ Per season power saving- 1,00,000 units.

2) Crystal Damage:

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

3) Smooth & Noise Free Operation:

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

4) Leakage & Wastage Free:

- ▶ Leakage free pump operation from Shaft sealing saving high purity "A" Mascuite

5) Automated Control System:

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

6) Reduction in Maintenance cost

- ▶ Stator life is long (2 Crushing season)

Benefits of using NETZSCH Pump

Reduced Energy Consumption



- 1 No NETZSCH Pump replaced 2 Nos ROTA Pumps
- Absorbed Power for Netzsche Pump - 16 kW
- Absorbed Power for ROTA Pump - $(22+22) \text{ kW} * 80\% = 35$ to 37.5 KW
- Saving in Absorbed Power = $36-16 = 20-22 \text{ KW}$
- Saving per day = $22*24 = 528 \text{ KW per Day}$
- Saving per Season of 180 Days = $528 * 180 = 95,040 \text{ KW}$
- Saving per Season of 180 Days = $95,040 \text{ KW} * 6 \text{ INR / KW}$
= 5,70,240 INR

Benefits of using NETZSCH Pump

Reduced Energy Consumption

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

Benefits of using NETZSCH Pump

Improved Quality of Crystal



- Sugar Price is based on its Qualities like Uniform Crystal Size, Brightness, Dust Free, etc.
- Due to Reduced Crystal Damage, expecting improvement in Quality and thus Gain in selling price
- We consider, increment of 5 Rs per Bag of 100 Kgs
- **Expected Price Increment = 12.8 Lacs Bags * 5 Rs = 64 Lacs**

Benefits of using NETZSCH Pump

Reduction in Sugar Dust / Rori due to Reduced Crystal Damage

As per Log Book Record:

Average Sugar Dust / Rori Collection per Day using Rota Pump - 8.22 Tons

Average Sugar Dust / Rori Collection per Day using Netzsch Pump - 5.17 Tons

Reduction of Sugar Dust collection using Netzsch Pump

$$= 8.22 - 5.17$$

$$= 3.05 \text{ Tons per Day}$$

Even with Correction, it shall be 2.5 Tons per Day.

If we consider Rs. 4 gain per Kg for Sugar Crystal instead of Sugar Dust, Saving per day = Rs. 10,000 (saved reprocessing cost)

For a Season of 160 day, Saving per Season = Rs 10000 * 160

$$= \text{Rs } 16.0 \text{ Lacs}$$

Benefits of using NETZSCH Pump

Clean Working Environment and Equipment Safety



- Dust Free Clean Working Environment
- Increased Safety for Equipment



Benefits of using NETZSCH Pump Leakage & Wastage Free:



- Pump was supplied with Gland Packing and Flushing Provision
- No Leakage from Shaft Sealing

Benefits of using NETZSCH Pump

Further Conclusion

- There is definite Direct and In-direct Benefit using NETZSCH PCP over other type of Pumps
- We achieved the given benefits by operating the pump with speed around 80 RPM. If we operate the pump around 50 RPM, then the Crystal Damage shall be at further lower side and thus Benefits at higher side.
- The pump is used for only handling Masecuite A and if we start to use for other Masecuite B and C , the Benefits is expected to be at further higher side.



THANK YOU!

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