



SELECTION OF SCREENING EQUIPMENT FOR FINAL PRODUCT QUALITY - OMIFCO'S EXPERIENCE IN UREA GRANULATORS

Rashid AL-FARSI, Sr. Mech. Engr



OUTLINE

- INTRODUCTION ABOUT OMIFCO
- HOW UREA GRANULATION IS WORKING (PFD)
- SCREENING OF UREA GRANULES
- PROBLEMS WITH THE EXISTING SCREENS DESIGN
- STUDY FOR SOLUTIONS
- BEST OPTION CRITERIA
- INSTALLATION NEW SCREEN (ROTEX)
- COMPARISON
- CONCLUSION



OMIFCO :
(Joint Initiative of Govt. of Oman & India)

Equity Holders

OOC : Oman Oil Company S.A.O.C, Oman, (50 % shareholder)

IFFCO : Indian Farmers Fertiliser Cooperative Ltd., India (25 % shareholder)

KRIBHCO : Krishak Bharati Cooperative Ltd., India, (25 % shareholder)



Plant Capacity & Technology

<u>Plant</u>	<u>Capacity</u>	<u>Licensor</u>
Ammonia*	2 x 1750 MTPD	Haldor Topsoe
Urea**	2 x 2530 MTPD	Snamprogetti

* CO₂ removal system, M/s Giammarco Vetrocoke

** Urea granulation, M/s Hydro Fertiliser ,Technology

Annual Installed capacity, MT

Ammonia	:	11,90,000
Urea	:	16,52,000



Project Site

- Located at Sur Industrial State on coast near Sur (approx. 200 KM away from MCT on new Quarayat Road).
- Total plant area is 170 hectare which includes provision for future expansion.
- Deep water 1,000 M offshore for jetty facilities& seawater cooling
- Gas supply pipeline available since 1995.



Project Milestones

- Project awarded on a Lump Sum Turnkey basis to Snamprogetti ,Italy &Technip-Coflexip France with a completion schedule of 35 months
- Completion of project achieved without any cost overrun and well within scheduled period.
- Operation, monitor & control of whole complex is done from Central control room (CCR).



OMIFCO – Some Milestones

- | | |
|--|------------|
| ➤ Project Commencement date | 15.08.2002 |
| ➤ Natural gas charged in the complex | Jul 04 |
| ➤ Power production started | Aug.04 |
| ➤ Sea water intake system started | Sep.04 |
| ➤ Steam production started | Sep 04 |
| ➤ Desalinated water production started | Oct 04 |
| ➤ Nitrogen production started | Oct 04 |
| ➤ Ammonia storage commissioned | Nov 04 |
| ➤ CO2 production at Ammonia-I | 13.03.2005 |



OMIFCO – Some Milestones

➤ Ammonia production -train 1	28 Mar. 05
➤ Urea production - train 1	12 April 05
➤ Ammonia production -train 2	14 May 05
➤ Urea production - train 2	28 May 05
➤ First ammonia export	20 April 05
➤ First urea export	07 June 05
➤ Preliminary acceptance	14 July 05

UFT FLUID BED GRANULATION PROCESS DESCRIPTION

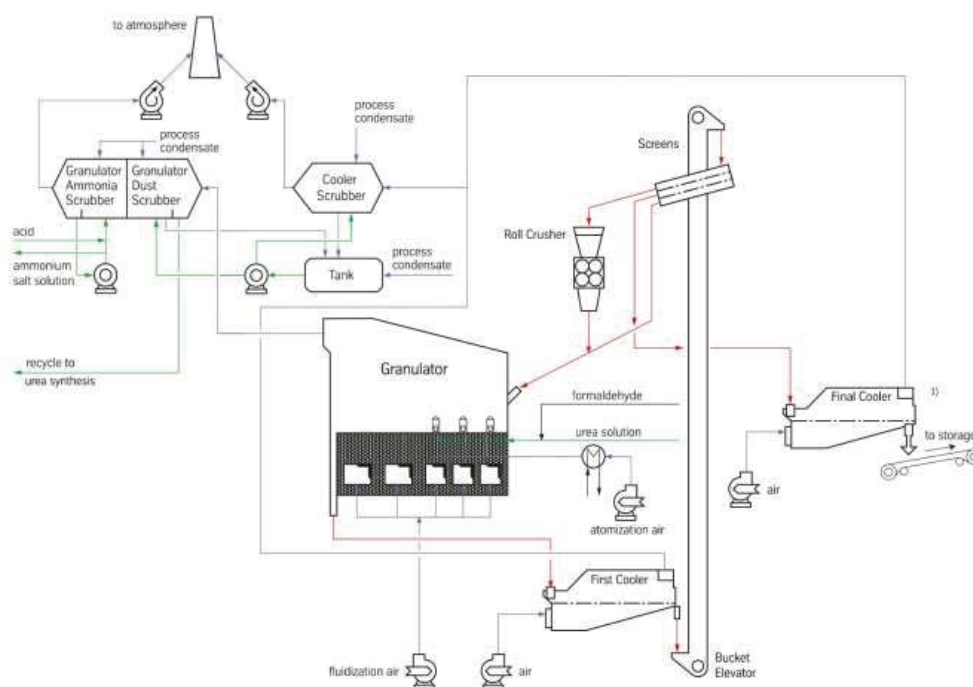
- The feed solution, typically a 97% urea solution, is dispensed to the injection heads and finely atomized upwards into the bed of moving particles. This spraying is assisted by air.
- Fluidization air delivered by a fan under the perforated plate, flows through the product layer and is exhausted at the granulator top.
- Granular urea flows out of the granulator at a controlled rate to a fluid bed cooler. After cooling, the granules are lifted by means of a bucket elevator to the screening section.
- The fines fraction is recycled directly to the granulator whereas the coarse material is first crushed and thereafter sent to the granulator as seeding particles.

UFT FLUID BED GRANULATION PROCESS DESCRIPTION

- The on-size product is sent to the warehouse after final cooling at the required storage temperature. The cooling of urea to a constant and sufficiently low storage temperature is one of the most significant parameters to avoid caking.
- The air from the granulator and coolers contains some urea dust which is easy to catch in standard scrubbing equipment. With industrially proven scrubbers, efficiencies of more than 99.5% are easily obtained. Therefore dust outlet concentrations of less than 0.1 kg per ton of urea produced can be achieved.
- Operation of the fluid bed granulation plant is simple and very reliable, guaranteeing a high on-stream factor. The granulator itself contains no moving parts, and its design is optimized to limit down time for cleaning to a strict minimum.



GRANULATION (PFD)



¹⁾ Depending on site condition, Bulk Flow Cooler can be applied as alternative.



PRODUCT CHARACTERISTICS

- Urea granules produced in the UFT fluid bed granulation have a well-rounded shape and are very hard. They resist particularly well to crushing and abrasion and hence are dust free, non-caking and completely free flowing, even after long storage and numerous handling and shipment operations.



PRODUCT SPECIFICATION (TYPICAL)

	Standard Size	Large Size
Total Nitrogen	46.3 % wt	46.3 % wt
Biuret	0.7 – 0.8 % wt	0.7 – 0.8 % wt
Moisture	0.2 % wt	0.3 % wt
Crushing Strength	4.1 kg (Ø: 3 mm)	10.0 kg (Ø: 7 mm)
Average Diameter	3.2 mm	6.3 mm
Size Distribution	95 % wt (2 - 4 mm)	95 % wt (4 - 8 mm)
Formaldehyde	0.4 % wt	0.4 % wt



- Urea Solution: temperature : 132 – 135 Deg.C.
Pressure : 2 bar (g) (at granulator header)
Concentration : 96%±0.5%(at granulator header)
- Atomization Air: temperature : 135 Deg.C.
Pressure : 0.45 bar (g) (at granulator header)
Flow rate : 66240 kg/h dry air
- Fluidization air: temperature : around 52 Deg.C.at granulator inlet
Pressure : around 700 mmWC (after dampers)
Flow rate : 389124 kg/h dry air
- Fluid bed: temperature : 104°-108°C in granulator chambers
height : around 1.0 m respectively 500-600 WC g



- Recycle solution: concentration : approx..45% urea
Temperature : around 40°-50° C
- Solids temperature :granulator outlet : 95° C
First fluid bed cooler outlet : 70° C
Final fluid bed cooler outlet : 45° C

VIBRATING SCREENS INSTALLED IN OMIFCO PROJECT FOR SEPARATION OF FRACTIONS OF UREA GRANULES

Product Screening Machine

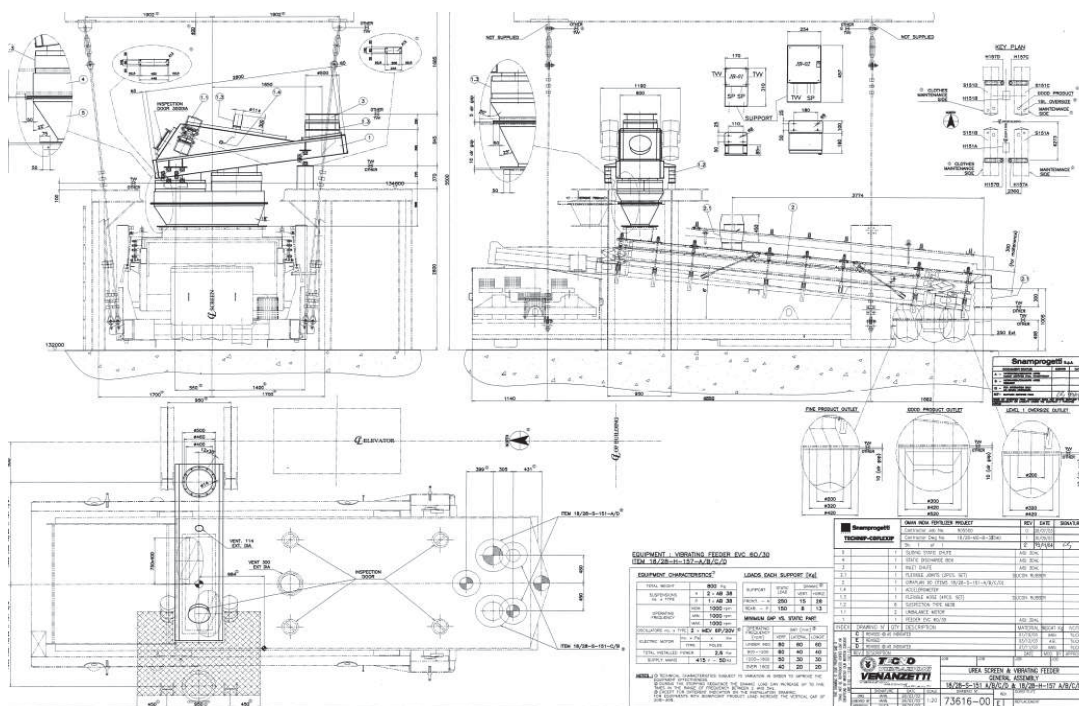
- Model :90 HVSM2
- Make: :CHAUVIN
- Dimensions per deck : :2000X4000
- No. of Decks : 2
- Screening area per deck : 32 m²
- Total weight when empty : 8800 kg
- Weight of vibrating body : 4400 kg
- Slope : 6°
- No. of screening machines installed per granulator : 4
- Capacity of each screening machine : 40 t/h
- Spare screening machine available : No
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MOTION CHARACTERISTICS

- Acceleration :2 g
- Speed :200 rpm



CAHUVIN SCREEN





CHAUVIN SCREEN IN OMIFCO



PROBLEMS FACING WITH THE CHAUVIN MAKE SCREENS IN OMIFCO

- The major moving elements which are prone to fail frequently in CHAUVIN screens are:
 - Long ropes
 - Suspension cables
 - Stabilizing rods
 - LHS & RHS cradle beams
 - Gear box bearings (each gear box consisting of 7 bearings)
 - Top bearing
 - Repair/replacement of screen mesh is tough
 - Wiremesh life is hardly one year
 - Declogging balls life is around one year



PROBLEMS FACING WITH THE CHAUVIN MAKE SCREENS IN OMIFCO

Long Ropes



PROBLEMS FACING WITH THE CHAUVIN MAKE SCREENS IN OMIFCO

Long Ropes





PROBLEMS FACING WITH THE CHAUVIN MAKE SCREENS IN OMIFCO

Suspension cables



PROBLEMS FACING WITH THE CHAUVIN MAKE SCREENS IN OMIFCO

Suspension cables





PROBLEMS FACING WITH THE CHAUVIN MAKE SCREENS IN OMIFCO

Stabilizing rods



PROBLEMS FACING WITH THE CHAUVIN MAKE SCREENS IN OMIFCO

LHS & RHS cradle beams





PROBLEMS FACING WITH THE CHAUVIN MAKE SCREENS IN OMIFCO

Gear box bearings



PROBLEMS FACING WITH THE CHAUVIN MAKE SCREENS IN OMIFCO

Gear box bearings





PROBLEMS FACING WITH THE CHAUVIN MAKE SCREENS IN OMIFCO

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HOW CHAUVIN SCREENS RUNNING





BEST SOLUTION OPTION

- To select the suitable screening machines, the following bench marks were set in selection of machines.

- ❖ No Gear box
- ❖ No ropes
- ❖ No couplings
- ❖ Higher Capacity (each screen capacity=3 times to CHAUVIN screen)
- ❖ Replacement of screen mesh shall be easy
- ❖ Weight of the screen shall not be more than 10 T

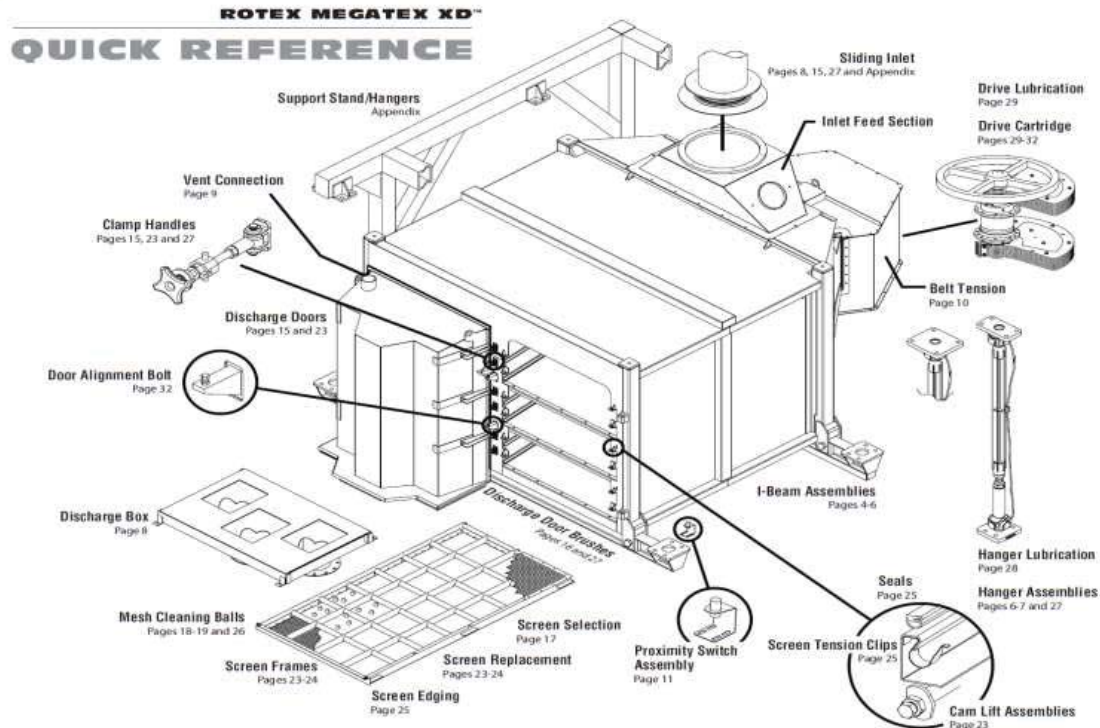


ROTEX MEGATEX XD-5300





ROTEX MEGATEX XD-5300



TECHNICAL SPECIFICATIONS OF ROTEX MEGATEX SCREENS

- | | |
|-------------------------------------|------------------------|
| • Model | :Megatex -XD-5300-2 |
| • Make | :Rotex, Europe |
| • No.of Decks | : 2 Deck |
| • Screening area of each deck | : 28 m2 |
| • Capacity of the screening machine | : 2300 (final product) |
| • Screen frame size | :1219 X 2286 mm |
| • No.of screen frames per screen | : 20 Nos. |
| • Weight of the screen | : 8210 Kg |
| • Speed of the drive mechanism | : 1000 rpm |
| • Power | : 15 KW |



ROTEX MOTION – WHY IT IS EFFECTIVE?

- Gyratory motion at inlet end : Quickly spreads & stratifies the material
- Elliptical motion at centre section : Provides gentle conveying
- Linear motion at discharge end : For effective near size separation



HOW ROTEX SCREENS RUNNING





CONCLUSION

- We have achieved the following benefits from the installed Rotex Megatex screens:
 - Higher capacity and now spare screen is available
 - Screen cleaning frequency is 40-50 days
 - Life of screen mesh is more than 2 Years
 - Life of PU balls is more than 2 Years
 - No major failures experienced
 - Highest reliability achieved
 - Product quality achieved 95% (2-4 mm)

Thank You

