

Replace steam ejectors/ liquid ring vacuum pumps with dry vacuum pumps.**(For Medak Bulk-drug Cluster)****Introduction:**

The pharmaceutical industry is one of the fastest growing segments of the Indian economy and has experienced rapid and sustained expansion since the second half of the 20th Century. Indian pharmaceutical manufacturing companies are present at each stage of the production process: APIs; pharmaceutical formulation intermediates (PFIs); and finished dose products (FDPs, the end product). PFIs are the intermediate product between an API and a finished dose. An API is the base ingredient of medicine that is biologically active, and the term bulk active (or bulk drugs/ingredients) is also used. Most of the Indian companies specialise in one or two of these three stages.

Today, India is one of the world's leading suppliers of generic drugs, which account for approximately 75 per cent of its market by volume¹⁶ and revenues of \$15 billion. The country is responsible for around one-fifth of the world's production of generics, which is considerably higher than its share the overall pharmaceuticals market (which stands at approximately 2%). India's Bulk Drugs Manufacturers Association describes the sector's recent growth as "phenomenal" and "one of the highest among the developing countries." Anti infectives, which include antibiotics, antivirals and antifungals, are the largest segment on the domestic market, accounting for around one quarter of total turnover.

The Indian pharmaceutical industry is highly fragmented, with more than 20,000 registered manufacturing units nationwide. It is also geographically dispersed: production takes place in multiple locations across the country, with the states of Maharashtra, Gujarat, Telangana, Andhra Pradesh, West Bengal and Tamil Nadu all registering a sizeable manufacturing and processing presence.

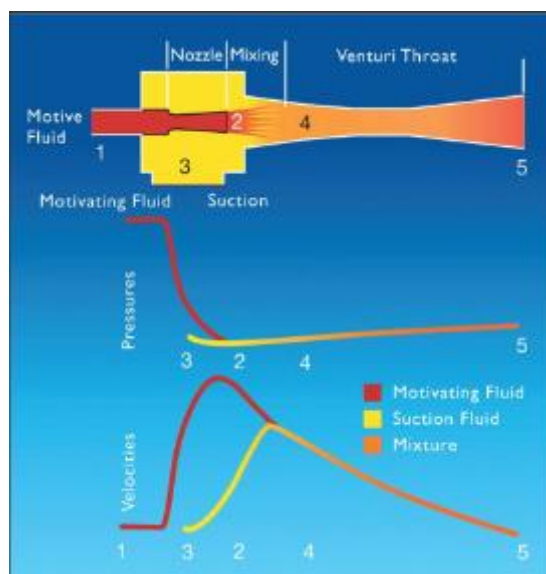
The city of Hyderabad in Telangana state, which was part of Andhra Pradesh until its division into two separate states in 2014, emerged early on as a pole of bulk drug manufacturing. In 1961, Indian Drugs and Pharmaceuticals Limited (IDPL), a government-owned company, was set up under the premiership of Jawaharlal Nehru with a mandate to "free India from dependence on imports and to provide medicines to the millions at affordable prices." Its establishment in Hyderabad (it also has offices in New Delhi and Rishikesh, Uttarakhand state) heralded the emergence and subsequent concentration of the generic drug industry in the city.

According to the Indian Bulk Drug Manufacturer's Association (BDMA), Hyderabad there are 47 SME registered units in Medak District. The source of energy for this units is coal and electricity. Coal is supplied from Singareni Collieries Company Limited (SCCL) and electricity is drawn from Telangana State Southern Power Distribution Company Limited (TSSPDCL).

Existing Practice:

Presently in most of the pharma plants uses steam ejectors/liquid ring vacuum pumps were in operation. Steam jet ejectors transports gases, liquids or solids from one pressure level to a higher-pressure level, particularly in sub-atmospheric applications. In operation, atmospheric- to high-pressure fluid passes through a motive nozzle where its pressure is dissipated, accelerating the fluid to high velocity as it exits the mouth of the nozzle. This high-

velocity fluid stream (usually steam) issuing from the nozzle mouth entrains the suction fluid. These two streams mix as they pass into a diffuser. The velocity profile constantly changes and the pressure inside the venturi of the ejector continues to rise as the discharge of the venturi is reached. In ejectors the steam consumption will be slightly high. In this type of Ejectors directly steam is used to generate vacume especially in solvent recovery stage. During this process the steam gets contaminated and also the condensate which requires a separate treatment.



Proposed technology:

It is suggested to replace steam ejectors/ liquid ring vacuum pumps with dry vacuum pumps. Dry vacuum systems are changing the face of technology in process industries especially in Pharmaceutical industries. These pumps turn out to be efficient, reliable, and eco friendly. This technology offers many advantages over traditional technologies like steam ejectors, liquid ring vacuum pumps and finds applications in various process industries. The major advantage of dry screw vacuum pumps is that they do not require any fluid (oil/water/steam) inside for creation of vacuum. This eliminates contamination of process vapours and provides better recovery of vapours thus also reduces the effluent load. Thus reducing the utility load like load on effluent treatment plant, reduction of make-up water to boiler etc. The dry vacuum systems produces precise vacuum as per the process requirement.

Energy & monitoring saving:

S. No	Parameter	Unit	Value	Remarks
1	Steam required to generate vacuum for Steam ejector	kgs/hr	300	In a typical 6 TPH boiler, more than 50% of the consumption will be utilised in vacume systems only in a Bulk drug unit
2	Evaporation ratio		01:04	

S. No	Parameter	Unit	Value	Remarks
3	Cost of Coal per kg	Rs	3	Cost of Coal per ton Rs 3500/ton
4	Cost of Steam per kg	Rs/kg	0.75	
5	Cost of Steam for vacuum generation	Rs/hr	225	
6	Annual operating hrs	hrs/yr	8000	
7	Annual operating cost of steam Ejector	Rs. Lakhs/yr	18	
8	Power consumption of Dry Vacuum Pump	kW	10	
9	Cost of unit(kwh)	Rs	7	
10	Annual Operating cost of Dry vacuum Pump	Rs. Lakhs/yr	5.6	
11	Annual Monetary savings due to dry vacuum pump	Rs	12.4	
12	Investment required for installation of Dry Vacuum Pump	Rs/unit	18	
13	Simple Pay Back Period	Months	17.42	

2.1 Benefits:

- Better Vacuum is achieved
- Steam Consumption is NIL and there by reduces load on boiler and other allied utilities.
- Load on effluent treatment plant will be reduced.
- Better solvent recovery when compared to traditional vacuum pumps (in fact no loss of solvent).
- Overall Maintenance cost is reduced.

Replication Potential:

Based on the discussion with association and also units it is estimated that the technology has a replication potential of 15 to 20 installation in the medak cluster. Based on the given replication potential the overall project is given as follows:

Replacement of Steam Ejectors with Electric Vacuum Pumps			
S.No	Parameter	Value	Units
1	Total No of SME Units in the cluster	47	No's
2	Replication Potential of the units in cluster	15	No's
3	Envisaged Annual Energy Savings per Unit	24.42	Lakh kWh
4	Investment Required per Unit	18	Lakhs
5	Envisaged Annual Energy Savings per Cluster (15 No's of Units)	366.3	Lakh kWh
6	Investment Required for Cluster (15 Units)	270	Lakhs
7	Cost of Electricity	7	Rs/kWh
8	Envisaged Annual Monetary Savings for Cluster	2564.1	Lakhs
9	Payback Period	1.3	Months
10	Savings in MTOE	3150	MTOE
11	Reduction in CO2 in Cluster	30035	TCO ₂

Availability of the technology

The technology is available in India and many manufacturer's have their service centres in the state of Telangana. NPC has contacted Everest Pumps and NPC is the process of finding out other suppliers of this technology in India.

Effect on the Process:

This technology will reduce the steam consumption and reduce the coal consumption in the plant as major portion of the steam is used for Vacuum Generation.

Reasons for Unpopularity:

This technology has yet not penetrated in to the SME cluster because of the following reason:

- ✓ Lack of knowledge and not updated with the recent developments.
- ✓ Financial constrain being an MSME.
- ✓ No one has yet demonstrated the results of the technology in MSME unit

Payback Period:

The simple payback period for the technology comes out to be 1.5 years.

Why the technology has not been implemented so far in the cluster?

SME units were not aware about this new technology.

Is there any operational risks involved?

No operational risks involved and won't effect the regular operation.

Boundary Conditions/Limitations

This technology needs to be implemented near the chiller room. As such there is no limitations.

Vendor Information:

1.0 Everest Pumps & Systems

103, Godavari Apts.,
Gr.Flr., Veer Savarkar Road,
Nr.Teen Petrol Pump,
Thane (W)-400602
Maharashtra, INDIA.

2.0 KAKATI KARSHAK INDUSTRIES PRIVATE LIMITED

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3.0 PREMIER PUMPS PRIVATE LIMITED.

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Hyderabad – 500076, Telangana, India.

4.0 Economy Refrigeration Pvt Ltd
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Vikas Centre, Dr C Gidwani Marg,
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5.0 Atlas Copco (India) Ltd.
Sveanagar, Dapodi,
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