

ON-SITE SEWAGE TREATMENT SYSTEMS FOR INDIAN MARKET

By Shahaveer Jamshedji



The Dual Misery

India suffers from a dual crisis - on one hand water scarcity, and on the other water pollution. This is a vicious cycle where the latter only makes the former more acute. A large part of the water pollution is on account of lack of sewage treatment facilities in the country. Water shortage and need for water conservation are well recognized by the masses although not everyone does their part. But a lesser known option is the reuse of treated waste water. Those in the industry are well aware of it but the masses are beginning to learn only now that the sewage they generate, after treatment, can be a substituted for fresh water, thereby, reducing their fresh water needs. Thus, breaking the vicious cycle of water pollution and water scarcity, it alleviates both the problems.

Decentralization is the Solution

Owing to our burgeoning population, dealing

with the sewage situation in the country has been a catching-up game that, however good the Government's intentions, is unlikely to ever do so by itself. Centralized Sewage Treatment Systems (CSTPs) need huge capital to set-up, and suffer from the lack of necessary infrastructure to convey the sewage to the plants, are plagued by operational issues and need trained and qualified manpower which is not always available. The sewage situation in the country cannot be solved by the Government alone and certainly not by centralized STPs. The obvious solution is decentralized, on-site sewage treatment plants that treat the sewage at the source where the treated water can be re-used for various applications. www.biomicrobicsindia.com

A wide range of treatment technologies and a multitude of companies, agencies and individuals have been offering treatment systems/ STPs for a wide range of capacities for the past several



Sewage and Wastewater Being Disposed by a Textile Factory Without Any Treatment (Source: Visionvert Blog, Wordpress)

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years with mixed success. Unfortunately, there are many STPs across the country which have either failed, are neglected or are no longer operational.

Current Status of Decentralized STPs

Most of the small-to-medium sized (5 KLD to 500 KLD) STPs being offered today are supplied by consultants, or system-integrators piecing together a system with disparate components. Thus, there is a lack of standardization. These systems do not conform to any standards such as NSF/ANSI STD 40, STD 350, EN 12566, etc and lack proper testing or certification. The result is systems that yield inconsistent treatment, are plagued with mechanical and operational issues and often, the plants either fail within 2-4 years, or the customer stops operating them due to the various problems encountered.

Some of the drawbacks of current STPs on the Indian market are:

- ▶▶ **Clogging of Media or Membrane:** This is a frequent issue with several types of STPs and often results in substandard treatment quality and subsequent system failure.
- ▶▶ **Heavy Maintenance and Mechanical Failure:** All too often, the STP is complicated using several mechanical devices - pumps, blowers, filters, membranes which need frequent maintenance.
- ▶▶ **Operations Intensive Systems:** Most STPs require daily operation. This includes but is not limited to:
 - Cleaning the bar screens
 - Sludge recirculation
 - Sludge drying
 - Filter backwash
- ▶▶ **Foul Odor:** This is the bane of most STPs and is an indication of an improper function.
- ▶▶ **Constant Replacement of Components (such as Blowers, Pumps, Diffusers):** This is an expense to the customer, one which he is not ready for, and unwilling to bare. Failure to replace the required components often leads to non-utilization/ break-down of an otherwise operational system.
- ▶▶ **Need for Trained Operators and Constant Monitoring:** Failure to carry

out operations/ tasks or erroneous operations such as the quantum and frequency of sludge recirculation, back washing of filters, etc can result in inconsistent treatment quality.

- ▶▶ Dependence on Chemicals/ dosing
- ▶▶ **Corrosion:** Most systems are above ground and fabricated in metal. The STP harbors a highly corrosive environment.

As a rule, STPs are neglected, improperly operated and, most often abused. Consequently, even technically correctly designed systems end up failing for no fault of the manufacturer/ system integrator.

In order to eliminate the human element in the system, there is now an inundation of highly sophisticated systems with sensors and complicated controllers using advanced electronics. But complexity has its downsides, especially when the systems are small. These systems become difficult to maintain and repair, not to mention expensive to replace components. They are also prone to damage by untrained personnel.

What India Needs

Simple Systems

What Indian customers need are systems that are simple in install, non-operated, easily monitored and maintained and have a long service life with as little replacement of components as possible. The fact remains that as long as water is supplied at highly subsidized rates, the customer will consider the sewage treatment plant as a non-productive expense that has been thrust upon him by the Environmental/ Pollution Control Authorities and he would rather not spend any more money and/or time on it.

Robust, Non-Operated and Few Mechanical Devices

Most people do not want to be associated with the STP, especially the more tedious operations and monitoring. Sewage is still a dirty topic and most would rather not have anything to do with it if they had a choice. You are not going to find a maintenance engineer or facilities manager who will rave about his STP. Consequently, STPs are neglected. In addition, the typical Indian user is undisciplined and one is likely to find all sorts of undesirable articles

and materials enter the sewage. Hence, the system should be robust, needing minimal human intervention and yet simple without the expensive sophistication. It should have the minimal number of mechanical devices to reduce maintenance and replacement of components.

Scalability

In order for decentralization of sewage treatment to be truly successful in India, the practice needs to be scaled up so that every residential society, factory, commercial complex and even individual houses have their own STP. While this may sound far-fetched to some, it is not unrealistic and in fact very much achievable. STPs should be as ubiquitous as home RO systems. But to achieve this, the systems on offer should be easy enough to size and install without great expertise. STPs need to be designed by sewage treatment experts, they do not need to be sized and installed by them.

Economical

It goes without saying that the system should be economical. But the right way to judge the economics is not merely by the capital cost or even the specific running cost but more so the life cycle cost. Here, the best system is one that balances capital cost, running cost and the cost of repairs and replacement of components. When calculating the economics, one must also consider the value of time spent by facilities managers and maintenance engineers dealing with a troublesome STP.

Conformance to Standards

How does one evaluate the performance of an STP? Merely by testing a random sample does not ascertain its performance as good or bad. An STP can only be said to be functioning well when the effluent quality is consistently within acceptable norms under real world conditions. NSF® standards are prolonged tests which ascertain the performance under various real world conditions over a prolonged period of time.

Small Footprint

The last requirement of the ideal STP for India is one that does not take up valuable real estate. Everyone knows how expensive land is. Why waste it on an STP? Besides, STPs are not the prettiest things. So they should be hidden

below ground. The space above can be utilized for much needed gardens, roads and parking.

Why FAST® is so Suitable for India

The FAST® sewage treatment system from Bio-Microbics is an aeration-based STP using attached biological growth on a fixed media. The system has been successful in over 60 countries and subjected to every kind of climatic condition and region in the world, from the Middle East to frigid Russia. The system is available in a wide range of capacities starting from just 600 liters per day, suitable for a single house (3 PE) to 600,000 liters.

Conforms to International Standards: FAST® has been rigorously tested and conforms to NSF® standards which subject the unit to testing for a minimum of 6 months under various conditions including change in sewage quality, surge flows, excess detergent, etc.

Simplicity: Simplicity and practicality are key to success in India. The systems are simple and easy to install, monitor/ operate and maintain.

- ▶▶ Due to its modular nature, sizing is simple and ease. FAST® systems do not need much expertise in the field of sewage treatment and hence scale up of operations as well as wide penetration across the country is possible.
- ▶▶ Easy to install: No expertise in sewage treatment is required for the installation of these systems. The modules are very easy to install.
- ▶▶ Non-operated: The FAST® system does not need an operator. There are no sand filters or activated carbon filters to be back-washed. There is no sludge recirculation and there is no bar screen to be cleaned! The system has an alarm system that alerts the customer when there is a problem.
- ▶▶ Easy Maintenance: No expertise is required to monitor or maintain the system. After some basic training from the manufacturer, routine visits to the plant is all it takes to monitor and maintain the systems. The system uses regenerative blowers which are silent, have extremely long lives and need almost no maintenance other than cleaning the air filter.
- ▶▶ Minimal Maintenance: The FAST® system

usually has only one moving part – the blower. There are no sewage transfer pumps, no sludge recirculation pumps and no diffusers.

- ▶▶ SaniTEE®: The SaniTEE® is a patented screen design that replaces a conventional bar screen. Unlike a bar screen which needs to be cleaned often and manually, the SaniTEE® has a clean-in-place design such that, one does not come in contact with the undesirable materials which means that anyone can clean it in a matter of minutes. It also requires much less frequency of cleaning (once in 3 to 4 months).
- ▶▶ FAST® is self-cleaning and clog resistant.

Flexibility: The FAST® system consists of engineered, modular units which can be with set performance for each module. This yields:

- ▶▶ Flexibility to size the system for any capacity
- ▶▶ Flexibility to size the system for any strength of sewage
- ▶▶ Flexibility of installation where there are physical constraints

Versatility of Applications: The FAST® system is suitable for any kind of biologically degradable influent and can handle sewage from residential, commercial or industrial complexes. FAST® has a high strength range to deal with high strength sewage from hotels and restaurants where BOD and Oil & Grease levels are much higher than residential of commercial sewage.

Versatile Installation: The FAST® system can be installed in any kind of tank either above ground or below ground. Concrete, FRP, metal and plastic tanks have been used to install FAST®.

Small Footprint: One of the greatest attributes of the FAST® system is that they can be installed underground. Even the largest FAST® is installed below ground and the effective footprint is only that of the blower unit/s. This is ideal for India as the saved space can be put to better use (parking, roads, green space). This works out to a huge cost saving to the customer.

Robust and Reliable: The systems are robust, capable of handling surge flows, recovering quickly from toxic flows, needing no attention and built to be abused. They yield consistent

treatment quality under varying conditions.

Non-Intrusive: The FAST® systems are silent, below ground and odorless. Consequently, they can be installed almost anywhere without being an eye-sore, creating noise pollution or being offensive. In many installations around the world, they have been installed at the entrance to commercial establishments, residents and factories.

The FAST® system allows the installer a myriad of treatment possibilities/ applications. He can size the systems with surety, be it a stand-alone FAST® system or married to other Bio-Microbics components or as part of a larger waste water treatment complex.

Conclusion

In order for India to secure its water resources, it needs to solve the sewage problem first. Considering India's size and massive population, decentralization and the reuse of treated water is its only option. But for decentralization to be truly successful, the products offered need to function in the Indian context. The ideal STP for India is one that is simple, well-engineered, robust, capable of handling the Indian environment and Indian user, yet affordable and able to get the job done.

About the Author

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Bio-Microbics was founded in 1996 to manufacture innovative wastewater treatment systems for homes, small communities, marine, and commercial properties. Today, Bio-Microbics has a presence in over 60 countries.

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