IJFEAT

INTERNATIONAL JOURNAL FOR ENGINEERING APPLICATIONS AND TECHNOLOGY

MOVING BED BIOFILM REACTOR

Pooja D.Mote[1], Arnavi V.Gode[2],Vaishnavi S. Mane [3]

[1]*Student, Civil Engineering, Jawaharlal Darda institute of engineering and technology, Maharashtra , India,* ***coolpooja.mote@gmail.com***

[1]*Student, Civil Engineering, Jawaharlal Darda institute of engineering and technology, Maharashtra , India,* ***arnavi.gode96@gmail.com***

[1]*Student, Civil Engineering, Jawaharlal Darda institute of engineering and technology, Maharashtra , India,* ***vaishnavimane96@gmail.com***

Abstract

According to present scenario and the need of water the reuse of water is needed for fulfil the water requirement. Scene The Moving Bed Bio-film Reactor (MBBR) technology is a wide range biological solution for wastewater treatment, based on a microbiology and treatment processes. This simple and strong biological treatment is suitable for specific wastewater treatment processes nitrogen reduction, high BOD/COD removal, including difficult industrial wastewater requirements. Its specially designed polyethylene bio-film carriers provide a large surface area for micro-organisms to grow on and perform specific biological treatment functions. Carriers are kept in suspension in the reactor either by the aeration system or mixers. Bacteria from the wastewater attach themselves to the floating carriers. The very compact configuration helps to attain a highly active biomass concentration in the reactor and a low settling load in the downstream solids separation process. Bio-film wastewater treatment technologies are very strong, especially when compared to conventional technologies like activated sludge.

Index Terms: BOD, bio-film ,sludge

-- ---------- *** ----------

INTRODUCTION

Now a days the water is the basic thing for living .The moving bed bio-film reactor is the treatment process on waste water this treatment help to make waste water more useful. There are several reasons for the fact that bio-film processes more and more often are being favored instead of activated sludge process, The treatment plant requires less space. There are already many different bio-film systems in use, such as trickling filters, rotating biological contactors ,fixed media underwater bio-filters, granular media bio-filters but the moving bed bio-film technology the bio-film grows protected within engineered plastic carriers, which are carefully designed with high internal surface area. The bio reaction is carried out in controlled environment in this process. The moving bed bio-film technology is based on specially designed plastic bio-film carriers or bio-carriers that are suspended and in continuous movement within a tank or reactor of specified volume. The Bio reactors comprise of a tank, fitted with aeration grid. The bacterial activity require dissolved oxygen, to synthesize the organic matter. This is complete by fleeting air in the form of small bubbles. The air is passed at the bottom of tank, so that complete volume of tank is utilized. Oxygen dissolved in liquid which can be used by the bacteria. The bacterial population is present on the media, which forms an essential part of the reactor system. The media is made of small plastic elements. Millions of such pieces are kept in the moving bed bio-film. The bacteria breed on the plastic media, by using the organic content in the raw sewage and the dissolved oxygen existing. Due to continuous aeration the media is set in revolving motion, so that continuous mixing takes place. The bacterial layer development on the media surface increase to a certain amount, and then gets sloughed off after a particular period. friendly biological mass consume organic matter for their metabolism. Excess biological mass leaves the surface of media and it is settled in clarifier. regularly a incarceration time of 5 to 12 h is provided in the reactors. MBBR were initially used for small sewage flow rates and because of less space requirement

2. NEEDS AND NECESSITY

To reduce the wastage of water by recycling it with the help of moving bed bio-film reactor;

To make water more useable and fit for household purposes;
To make water useable for industrial purposes;
To construct more efficient and economical water treatment plant.

2. LITERATURE SURVEY

1. According to Sandeep Joshi (Shrishti Eco-Research Institute (SERI) Moving Bed Bio-film Bioreactor (MBBR) process is a combination of activated sludge process and bio-filter processes. they used polyethylene as a media reactor. Moving Bed Bio-film Bioreactor (MBBR) process uses the whole tank volume for biomass growth. It uses simple floating media, which are carriers for attached growth of bio-films. Bio-film carrier movement is caused by the agitation of air bubbles. This compact treatment system is effective in removal of BOD as well as nitrogen and phosphorus while facilitating effective solids separation. This reactor can have any shape and different loads in a reactor volume depending on carrier filling. Design of the reactor is based on the actual wastewater quality and local conditions. MBBR units are placed in series based on the load entering each reactor Neutralised and matured wastewater
2. In the Harlen H. Bengtson suggested that the mbbr process is a attached growth of microbiological waste water treatment process that microorganism is that carry that treatment are attached to a solid medium as in trickling filter system. By disparity in suspended growth biological waste water treatment process, like the activated sludge process the microorganisms that complete the treatment. which are kept suspended in the mixed liquid in the aeration tank the plastic carrier o provide a surface on which bio-film grow. The plastic carrier are kept suspended in the aeration tank by an aerator for an aerobic process or by mechanical mixing for an anoxic or anaerobic process the plastic carrier are reserved in the system by sieve at the outlet of the tank the Moving Bed Bio-film Bioreactor (MBBR) process doesn't require sludge recycle, because the biomass remain in the system attach to the plastic carrier the required reactor size for an Moving Bed Bio-film Bioreactor (MBBR) process is usually much smaller than for an activated sludge process like the RBC or trickling filter. It can be used for BOD removal, biological nitrification, biological denitrification, and biological phosphorus removal

OPERATION AND MAINTENANCE

A Moving bed bio-film reactor does not require backwashing or return sludge flows. It has minimum head-loss. Coarse-bubble aeration in the aeration zone in the wastewater treatment tank provide simplicity of operation at low-cost. Agitation constantly moves the carrier elements over the surface of the screen thus prevent clogging. Maintenance of MBBR system includes screening, influent equalisation, clarifier system, sludge handling and incorporated control system. There is no need to maintain food/Micro-organisms ratio as there is self-maintenance of an best possible level of productive bio-film. Skilled labour is required for standard monitoring and operations of pumps and blowers.

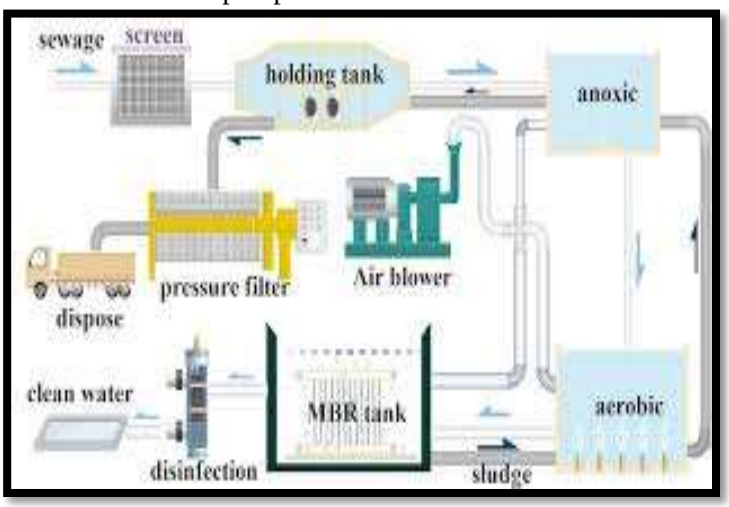

Figure 1 MBBR Based Scheme

DESIGN AND CONSTRUCTION PRINCIPLES

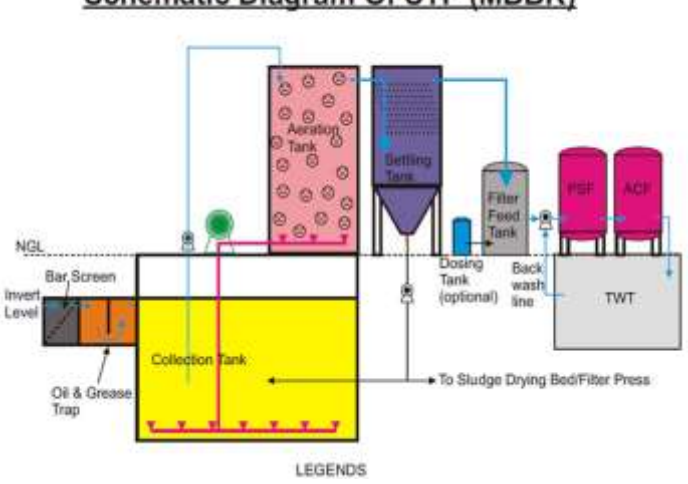

Figure 2 Design and construction principles

This reactor can have any shape and different loads in a reactor volume depending on carrier filling. Design of the reactor is based on the actual wastewater quality and local conditions. MBBR units are located in series based on the load towards the inside each reactor. Neutralised and established wastewater passes through MBBR for reduction in BOD/COD. Most of the MBBR plants are provided with vertically or horizontally mounted rectangular mesh sieves or cylindrical bar sieves. MBBR in combination with a septic tank or a pre-coagulation

step as a pre-treatment unit, depending on the local surroundings and input quality. It is a very strong and dense option for secondary treatment of municipal wastewater, having removal efficiency for BOD 90 – 95% (low rate) and that of 75 – 80% for high rate. Average nitrogen removal is about 85%. There is no need for sludge recirculation. Phosphorus and faecal coliform reduction is feasible with additional passive (non-mechanical) or active (mechanical)

Material used

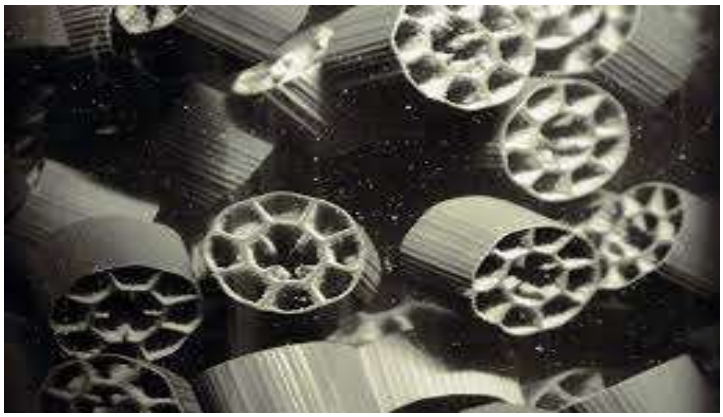

Figure 3 Plastic carrier

Bio-film carriers are made up of high density (0.95 g/cm^3) Polyethelene. These are normally shaped as small cylinders with a inside cross and outside with the fins. The standard substantial of carrier is below 70% with a maximum specific area not more than 465 m^2/m^3. Generally, design load for COD-BOD removal is 20 g COD / m^{2}d. Smaller carriers require smaller reactor volume at a specified loading rate (as g/m^{2}d) when the carrier filling is same. HRT of the reactor is about 3 – 4 hours for effective BOD and nitrogen

Merits And Demerits of Moving Bed Bio-film Reactor

MERITS

Moving Bed Bio-film Reactor needs less space since there is no primary clarifier and detention period in reactor is generally 4-5 hour.

Ability to withstand shock load with equalization tank option. High operator oversight is not required.

Higher effective Sludge Retention Time (SRT) which is favourable for nitrification. Responds to Load Fluctuations without Operator intervention.

Lower sludge production. Less area required.

Resilient to toxic shock.

Process performance independent of secondary clarifier (due to the fact there is no sludge return line).

DEMERITS

High operating cost due to large power requirements

Not much experience available with larger capacity plants (>1.5MLD).

Skilled operators needed.

No energy production.

Effluent quality not up to the mark in India.

Much less nutrient removal.

Designed criteria not well established**.**

CONCLUSION

The moving bed bio film reactor is the successful process, strong and dense reactor for waste water treatment.

The effectiveness of the reactor has been verified in many process combinations, both for BOD-removal and nitrogen removal.

It has been used for the construction of small and large waste water treatment plants.

The rate of BOD-COD has been compact by use of method.

FUTURE SCOPE

conservative biological wastewater systems can greatly help from assessable developments to the treatment process through an MBBR plant advancement

By retrofitting a conservative system with abundant exposure to air, retention screens, and bio-carriers, wastewater treatment practice can be doubled in capacity.

This is carry out easily with minimal plant downtime and no construction.

In space-constrained sites, a significant benefit is the increased feat without additional land use.

REFERENCES

[1]. Harlen H.bengtson,PhD,P.E. Wastewater Engineering: Treatment and Resource recovery(moving bed biofilm reactor)sun cam education course 2010

[2]. Headworks biological wastewater treatment solutions and wastewater screens pvt.ltd.

[3]. Sandeep Joshi (Shrishti Eco-Research Institute (SERI) Handbook of Biological Wastewater Treatment: Design and construction of Activated Sludge Systems(*2012-01-01).*