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DEVELOPMENT OF COLLECTION TANK TO CONTROL THE ODOURNESS LEVEL OF ETP IN PRINTING INDUSTRY

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ABSTRACT

Water is one of the maximum crucial natural assets for all existence on Earth. The availability and satisfactory of water always have played an important part in figuring out now not simplest wherein human beings can live, however additionally their nice of life. Commercial water use includes clean water for resorts, lodges, eating places, workplace buildings, other business centers, and textile and printing industry. Domestic water use might be the most important everyday use of water for most human beings. Industrial water use is a precious beneficial aid to the tiruppur industries for such purposes as processing, cleaning, transportation, dilution, and cooling in production centers. Major water-using industries encompass textile, chemical, printing, and dyeing enterprise. the printing industry screen cleaning chemical and dyes waste water is stored in collection. three days continuously stored in printing waste water at the time odourness is very high its effect to environmental and human health effects. is Industries often reuse the same water over and over for more than one purpose. According to innovative part in this project, initialing the aeration of pre-primary process in collection tank in the continuous motion with the help of mixture blade in the combination of chemicals to reduce the odourless and time saving, and main aim is to avoid the environment pollution.

Keywords: waste water, odourless, chemicals, dyes.

INTRODUCTION

Water is the primary factor that's used in all form of the printing Industries. Water is used for precise techniques within the industries. It can be used for washing, dilution, formation and condensing the steam. But all water used in the one of a kind enterprise isn't always totally fed on. Generally, almost all of the industries generate waste water that desires urgent attention. Water use in enterprise is a double-edged sword. On one hand it puts huge strain on nearby water sources. On the alternative, wastewater discharged from the industry pollutes the local environment. Water is required, often in large volumes, by industries as process inputs in most industries. In other cases, like printing and dyes and textile industry. Water is used as a raw material turned into a manufactured product and exported out of the local water system. However, in most industries it is essentially used as input and mass and heat transfer media. In those industries a totally small fraction of water is really consumed and misplaced. Most of the water is clearly supposed for non-consumptive procedure makes use of and is in the end discharged as Effluent. Effluent treatment plant, also called ETP is a waste water remedy process (WWTP) that is used to treat waste water. It's mostly used in industries like pharmaceuticals, textiles, and chemicals where extreme water contamination is a possibility.

AIM

- To reduce the procedure timing as well as the odourness.
- To enhance the quality of water in series tank before aeration tank method.
- Development of collection tank .
- To Installing mixture blade in collection tank by maintaining the COD, pH , DO – dissolved oxygen using chemical flocculation.
- To improve the wall level of collection tank .
- Providing safety precaution.

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OBJECTIVE

- To prevent pollution of receiving water
- To prevent offensive odour in the water.
- Reduce organic content(reduction of ph)
- Aeration tank by maintaining the pH level by using lime(15k:4) , polyelectrolyte (15k:2), ferrous(15k:2).

PROBLEM IDENTIFICATION

- odourness High
- Safety measures-hand rail
- Environmental affects

Methodology

- Review of literature
- Collecting information of ETP
- Study and Analysis of process.
- Data collection of staff.
- Taken photograph of ETP process
- Based on photograph find out the problems.
- Obtain result using solidworks software.
- Suggesting better idea to reduce the odourness.
- Obtain result using odour meter and solidworks software.

DATA COLLECTION

DATA COLLECTION OF EFFLUENT TREATMENT PLANT DIMENSIONS

<table>
<tr><th>Dimensions</th><th>photo</th></tr>
<tr><td>Collection tank

3.5X3.4WX2.5D = 30.94KLtrs</td><td>
</td></tr>
<tr><td>PRIMARY SETTILING TANK

3.5LX2.5WX30D = 2625Kltr</td><td>
</td></tr>
</table>

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AERATION TANK ; 3.5LX33.WX4.8D = 55.44 KLts	
Secondary Settling Tank 3.5LX25WX3.0D = 26.25KLtrs	
Treated Water Tank 3.5LX2.7WX2.5D = 23.63 KLtrs	
Lime **40 liter**	
Ferrous 40 Ltrs	
POLYELECTROTE 40 Ltrs	

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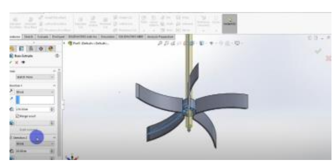
Carbon Filter 1000 liter D-50CM H – 600CM	
Solid Filter 1200 Ltrs	
Sludge Storage 1X4 = H – 5 FEET W – 5 FEET D – 5 FEET	
Designed Blade Dimension Angle 30degree Length – 30 cm Width – 7cm Shaft length – 200cm	
Pipe Dimensions All pipe size are – 2 inch pvc pipe	

Odour Meter ;

Using odor meter to measure the odourness in collection tank distance of 3m.. Printing enterprise is lot of chemical used to printing the cloths . The screen changed into cleaned to a couple of dyes in printing industry. that washed waste water is mixed to many chemicals in screen washing .all printing waste waters are stored in collection tank in effluent treatment plant process in printing industry . waste water stored collection tank maximum 3 days without run in effluent treatment plant in printing industry . odourness is very high during chemical and dyes waste water stored in collection tank

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FIG ODOR METER

Wastage smell

Printing waste water concentration

Low – 0 to 50
Medium – 50 to 100
High – 100 above

Environment Protection Rules, 1986 ;

2 minutes of sample testing time

DATA COLLECTION OF ODOUR ;

SI.NO	DATE	READING in ppm
1	1-04-2022	850.6
2	4-04-2022	980
3	7-05-2022	740
4	11-04-2022	870
5	15-04-2022	1021
6	18-04-2022	983
7	21-04-2022	732
8	23-04-2022	812
9	26-04-2022	780
10	05-05-2022	890
11	09-05-2022	850

ODOUR LEVEL

This is the odourness level in collection tank of textile printing industry

ETP PROCESS DATA COLLECTION

Table of chemical

S.NO	Chemical	QTY	Storage QTY for 3 days
1	Lime for Coagulation & pH Correction	27	90
2	Polymer for Flocculation	0.97	4
3	Dewatering Polymer for Primary Sludge	0.37	2
4	$FeSO_4$	16.6	50
5	Hydrochloric Acid	1.97	6
6	Urea	2.6	7
7	DAP	0.8	3

CHEMICAL MIXING QUANTITY

MIXTURE BLADE DESIGN

Mixture Blade specification ;

- RPM meter - 1050 kmph

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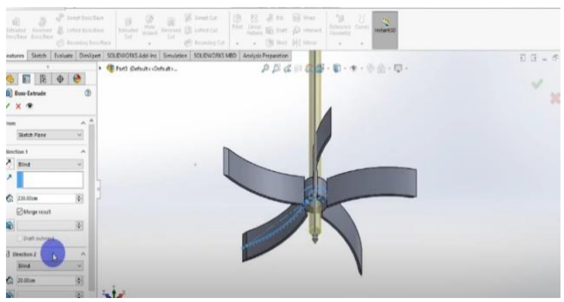
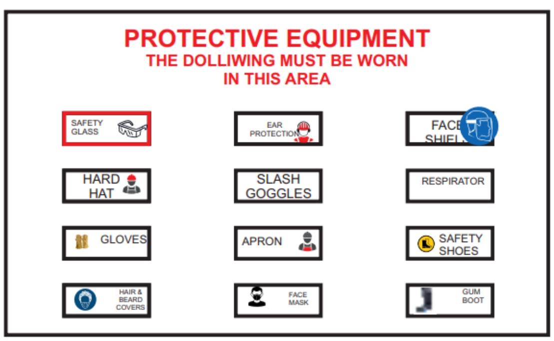
- MIXTURE Blade material – ms 304 material
- Blade thick - 3 mm
- Blade length – 30cm
- Already exciting blade
- Shaft size – R20XL120CM
- Collection tank and aeration tank – 15 feet
- Shaft inside tank length 2 feet
- 

MIXTURE BLADE DSIGN

PPE :



8.CURRENT COLLECTION TANK :

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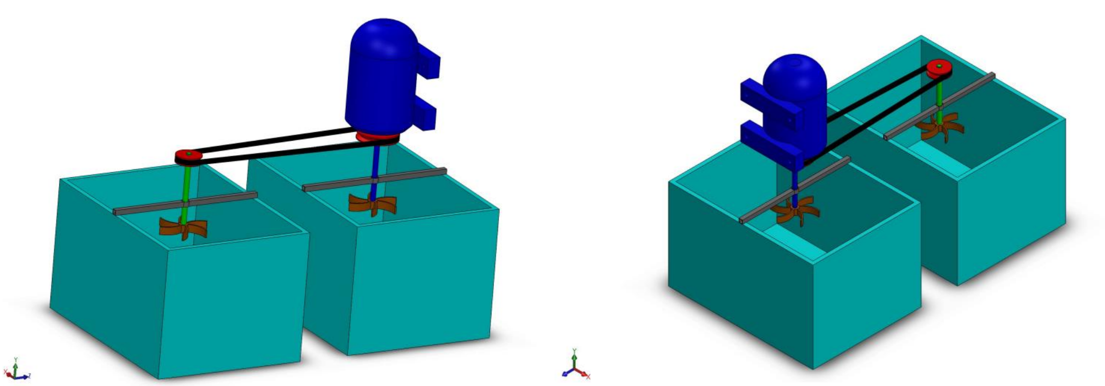
FIG : 8.CURRENT COLLECTION TANK

The printing enterprise many dyes are used to printing in layout of cloths and that screens are wiped clean waste water is stored in collection tank. Many dyes are combined to cleansing display that each one are saved in collection tank . It's miles excessive odourness.

COLLECTION TANK IMPROVEMEN D

ESIGN



DESIGN OF COLLECTION TANK

FIG 9.1 DESIGN OF COLLECTION TANK

Using material – ms 304 material

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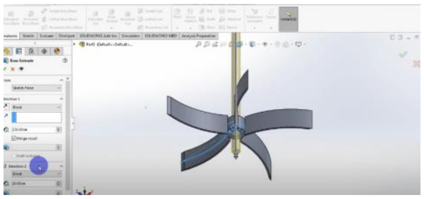
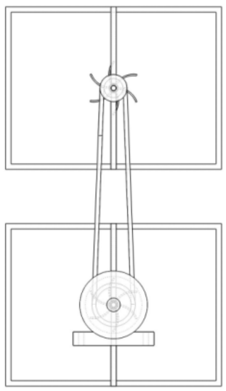
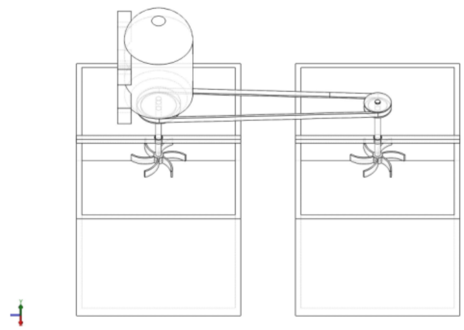


TOP VIEW ;

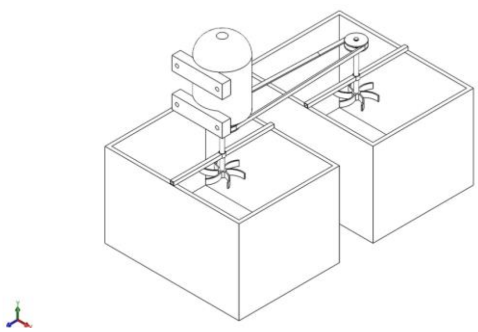




TOP VIEW **SIDE VIEW**

SIDE VIEW

TOP SIDE VIEW



Parts ;

[1] Mixture blade
[2] Two support part
[3] Shaft
[1] Chain drive
[2] Two side support pipe
[3] 2 pulley
[4] 6025 bearing

WHILE PLANNING THE LIST OF PPE, THE FOLLOWING TYPES OF SITUATIONS SHOULD BE CATERED FOR

1. Impact / Penetration / Compression while doing maintenance tasks
2. Chemical Handling
3. Heat/cold and wetting
4. Harmful dust
5. Oxygen deficiency

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6. Obnoxious odours of decomposing matter
7. Hydrogen Sulphide presence
8. Light (optical) radiation
9. Biological exposure from raw / treated effluents and sludge handling
10. Noise of machines and vibrations.
11. Electric shock
12. Rain / Storm

General List of PPE:
1. Safety Boots with non-skid soles and Steel Toes.
2. Electrical Hazard safety Toe shoes
3. Gas Masks and Face Shields
4. Oxygen meters for ascertaining type of atmosphere in a confined area.
5. Single-use Ear Plugs / Ear-muffs
6. Safety Goggles
7. Helmets / Hard Hats
8. Latex Rubber/ Butyl Rubber/ Fabric / Chemical Resistant Gloves
9. Overall Clothing
10. Aprons for laboratory Personnel
11. Safety Belts
12. First Aid Box
13. Fire extinguishers
14. Respiratory Protective mask with man pack cylinders

SAFE HANDLING OF CHEMICALS

Since coping with of chlorine and corrosive chemical substances form part of many ETPs, special interest have to be Given to secure coping with of those chemicals. Safe Handling of Chlorine Pure chlorine is available in two forms: fuel and liquid. Chlorine fuel is resultseasily liquefied underneath pressure. Typically, a business cylinder consists of liquefied gas below pressure. Chlorine fuel has a unpleasant, sharp, smelly, penetrating odour. In airborne concentrations above 1000 components in keeping with million (ppm) it has a greenish-yellow shade. In smaller concentrations it is colourless. Chlorine gasoline is 21⁄2 times heavier than air and has a tendency to waft downhill and pool in lower regions. Wind and climate, but, will cause a chlorine gasoline cloud to disperse, spreading it in all commands, even uphill. Liquid chlorine is a obvious, amber-colored, oily fluid this is 11⁄2 instances heavier than water. Liquid chlorine has a immoderate compression ratio. The ratio of liquid to gas is 1 to 460, this means that that 1 L of liquid chlorine expands to form 460 L of herbal chlorine gas. The maximum allowable interest of chlorine someone can be exposed to in an eight-hour period is 0.Five ppm, Chlorine gas is particularly used as a disinfectant in:
1. Swimming pools
2. Water treatment plants
3. Sewage treatment
4. Community water supplies, including water used for irrigation

Chlorine is also used in:
1. Pulp and paper industries
2. Pool chemical products
3. Cleaning products
4. Mining processes
5. Bleach manufacturing
6. Plastics manufacturing

Chlorine is corrosive. It can burn wet body surfaces inclusive of the eyes, nose, throat, lungs, and moist skin because it office work dangerous acids while it reacts with moisture. Repeated publicity to chlorine does now not produce an immunity or tolerance. Long time period publicity to low concentrations of chlorine might also purpose a gradual decrease in lung overall performance. A single publicity to a excessive attention can cause the equal effect.

General Chemicals used in Effluent Treatment:
1. Neutralization / pH correction: Hydrochloric acid, Sodium Hydroxide / Lime

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2. Coagulant / Settling Aids: Aluminium Sulphate, Ferric Aluminium Sulphate, Ferric Sulphate, Ferric Chloride, the ones may be unbiased or in mixture with Poly Electrolytes (Polymers).
Three. For Specific Ion removal, chemical substances required as in step with chemistry of treatment.Four. Nutrients: Urea, Di-ammonium Phosphate five. Disinfectant: Chlorine, Bleaching Powder (Sodium Hypo-chlorite), Ozone
6. Adsorption / Absorption: Activated Carbon
7. Ion Exchange – based totally on the unique ion to be eliminated. Few Examples of Corrosive Substances used in ETP
1. Sulphuric acid
2. Chromic acid
3. Stannic chloride
4. Ammonium bi-fluoride
5. Bromine
6. Ammonium hydroxide

GENERAL CHARACTERISTICS OF ETP CHEMICALS

1. Acids and Alkalis fall into the category of Corrosive chemical compounds. Corrosives are most commonly acids and alkalis, however many other substances can be severely unfavourable to dwelling tissue.
2. Corrosives can purpose seen destruction or irreversible adjustments at the website on line of touch. Inhalation of the vapour or mist can motive extreme bronchial inflammation. Corrosives are in particular damaging to the pores and skin and eyes.
3. Certain substances taken into consideration non-corrosive in their natural dry country are corrosive whilst wet inclusive of while in touch with moist skin or mucus membranes. Examples of those materials are lithium chloride, halogen fluorides, and alkyl iodide.
Four. Sulphuric acid is a very robust dehydrating agent and nitric acid is a robust oxidizing agent. Dehydrating dealers can reason extreme burns to the eyes because of
their affinity for water.

USE AND STORAGE OF CORROSIVES

1. Always keep acids one at a time from bases. Also, save acids in acid garage cabinets a ways from flammables due to the truth that many acids are also robust oxidizers.
2. Do no longer artwork with corrosives until an emergency shower and non-prevent waft eyewash are available. Three. Add acid to water, but in no manner add water to acid. This is to prevent splashing from the acid due to the technology of immoderate warm temperature as the 2 substances blend. Four. Never shop corrosives above eye degree. Store on a low shelf or cabinet. Five. It is a outstanding exercising to store corrosives in a tray or bucket to contain any leakage.

USE AND STORAGE OF HYDROFLUORIC ACID

1. Hydrofluoric acid is quite volatile and deserves unique point out. Hydrofluoric acid can motive intense burns and inhalation of anhydrous hydrogen fluoride can be fatal. Initial pores and skin touch with hydrofluoric acid might not produce any signs and symptoms.
2. Only human beings really skilled inside the dangers of hydrofluoric acid must use it. Three. Always use hydrofluoric acid in a nicely functioning fume hood. Be certain to put on non-public shielding apparel! Four. If you agree with you studied that you have are to be had in direct contact with hydrofluoric acid: wash the area with water for at least 15 minutes, eliminate clothing, after which right away are seeking out medical hobby. If hydrogen fluoride vapours are inhaled, skip the human beings right away to an uncontaminated atmosphere (if secure to achieve this), maintain the individual warm, and are trying to find set off medical interest. Five. Never keep hydrofluoric acid in a pitcher container due to the fact it's miles incompatible with glass.
6. Store hydrofluoric acid one after the other in an acid storage cabinet and keep fine that quantity critical in the lab.
7. Creams for treatment of hydrofluoric acid exposure are commercially available.

HEALTH HAZARDS ASSOCIATED WITH CORROSIVES

1. All corrosives own the assets of being severely unfavorable to living tissues and moreover assault exclusive materials along with metal.
2. Skin contact with alkali metal hydroxides, e.G., sodium hydroxide and potassium hydroxide, is extra dangerous than with sturdy acids. Contact with alkali metal hydroxides usually motives deeper tissue harm because of the truth there's less pain than with an acid publicity. The exposed individual may not wash it off thoroughly sufficient or are looking for for activate scientific attention.

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Three. All hydrogen halides (HF, HCl, HBr and HI) are acids which is probably excessive respiratory irritants and additionally reason extreme burns. Hydrofluoric acid is specifically dangerous. At low concentrations, hydrofluoric acid does now not proper away display any signs and symptoms or symptoms and signs upon touch with skin. It can also take numerous hours for the hydrofluoric acid to penetrate the pores and skin before you may notice a burning sensation. However, via this time everlasting damage, along with 2d and 1/three-diploma burns with scarring, can result.

ACUTE HEALTH EFFECTS

Inhalation	irritation of mucus membranes, difficulty in breathing, fits of coughing, pulmonary edema
Ingestion	irritation and burning sensation of lips, mouth, and throat; pain in swallowing; swelling of the throat; painful abdominal cramps; vomiting; shock; risk of perforation of the stomach
Skin Contact	burning, redness and swelling, painful blisters, profound damage to tissues, and with alkalis; a slippery, soapy feeling
Eye Contact	stinging, watering of eyes, swelling of eyelids, intense pain, ulceration of eyes, loss of eyes or eyesight

CONCLUSION:

The functioning of every industries having the pros and cons, with the suitable solution and problems in all field of construction. The engineering control is focused to maintain the well ecological system to carry forward the furnished technology to withstand the stability of the work. To reduce the environmental pollution and as per the Factories act 1948.Sustainable energy resource and productivity are the major role to develop the new innovation ,the chemicals which is used for flocculation process to minimize the timing of sludge sedimentation, due to the renewable energy consumption for the unit process and unit operation. Here is the technology to overcome the time saving, and reducing the odourless in the waste water treatment by installing the mixture blade in the collection tank to reduce the challengeable criteria in the waste water treatment plant process. In this project ,by using the techniques the value has been changed as the standards says in the Environmental protection act,1986

REFERENCE;

[1] P.A. Neale, R. Altenburger, S. Aït-Aïssa, F. Brion, W. Busch, G. de Aragão Umbuzeiro, M.S. Denison, D. Du Pasquier, K. Hilscherová, H. Hollert, D.A. Morales, J. Novák, R. Schlichting, T.B. Seiler, H. Serra, Y. Shao, A .J. Tindall, K.E. Tollefsen, T.D. Williams, B.I. EscherDevelopment of a bioanalytical test battery for water quality monitoring: fingerprinting identified micropollutants and their contribution to effects in surface water

[2] Sossallaetal.,2020N.A. Sossalla, J. Nivala, B.I. Escher, T. Reemtsma, R. Schlichting, M. van Afferden, R.A. MüllerResilience of micropollutant and biological effect removal in an aerated horizontal flow treatment wetland

[3] Water, 12 (2020), p. 3050, 10.3390/w12113050

[4] Ilyas and van Hullebusch, 2019H. Ilyas, E.D. van HullebuschRole of design and operational factors in the removal of pharmaceuticals by constructed wetlands

[5] Water (Switzerland), 11 (2019), pp. 1-24, 10.3390/w11112356

[6] Hijosa-Valsero et al., 2011M. Hijosa-Valsero, V. Matamoros, R. Sidrach-Cardona, A. Pedescoll, J. Martín-Villacorta, J. García, J.M. Bayona, E. BécaresInfluence of design, physico-chemical and environmental parameters on pharmaceuticals and fragrances removal by constructed wetlands.Water Sci. Technol., 63 (2011),pp. 2527-2534, 10.2166/wst.2011