International Journal of
Advances in Scientific Research and Engineering (ijasre)

E-ISSN : 2454-8006

DOI: 10.31695/IJASRE.2020.33860

Volume 6, Issue 8
August - 2020

Aerobic Anaerobic WWTP Design Simulation in the Jeans Industry to Reduce TSS Levels according to Quality Standards

E SUHARTONO[1], S SETYOWATI RAHAYU[2] B SETYOBUDI[1] & M YUSA[3]

[1]Department of Civil Engineering, State Polytechnic of Semarang

[2]Department of Mechanical Engineering, State Polytechnic of Semarang

[3]Department of Informatics, University of Bengkulu

Indonesia

ABSTRACT

The rapid development of the textile industry has induced an increase in environmental pollution. This is not only harmful to the environment but is also a threat to living things, especially in humans. Dyes from textile waste when disposed into the water, pollute its surface thereby preventing sunlight into it. The level of organic compounds in water can be measured by TSS parameters. In general, the discarded TSS level ranges from about 475 to 678mg/L. According to the Provincial Regulation of Central Java Number 5 of 2012 on Amendments to the Regional Regulation of Central Java Number 10 of 2004 on Wastewater Quality Standards, the maximum allowable level for Textile and Batik Wastewater for TSS is 50mg/L. The Aerobics Anaerobic WWTP Design function is to reduce TSS levels in accordance with quality standards. The simulation results showed that, at the discharge level of 50 m3/day, the initial TSS level of 678mg/L decreases to 40.7 mg/L in accordance with the established Quality Standards and become an environmentally friendly Industry.

***Kkeywords*:** *Wastewater, Jeans Industry, Aerobic Anaerobic WWTP, Environmentally Friendly*.

1. INTRODUCTION

"Ryan Jeans" Small and Medium Enterprises (SME) at Surabayan Wonopringgo Pekalongan still survives even on this year, the production is getting increase and increase and the marketing increases as much as 10% of the increasing sum of production/days from 45 score/day become 50 score/day, so that the profit increases 10%. We did the dedication for community with scheme Regional Superior Product Development Program (PPUD) in Kabupaten Pekalongan. In 2020 by adding Appropriate technology (TTG) in the form of clean water supply, Appropriate technology (TTG) dryer, and Appropriate technology (TTG) Showroom with 4x6 m^2 in size and medicine room also Office and Coloring Training with natural dyes (indigo) and wearing Personal Protective Equipment (PPE) for the employees

2. ACTIVITY METHOD

We accompany "Ryan Jeans" Small and Medium Enterprises (SME) at Surobayan Wonopringgo Pekalongan by giving brief and discussion for getting the increase of production and marketing by using website and facebook also fixing production become green product through appropiate technology. Beside that we are also doing activity by :

a. Designing Wastewater Treatment Plant (WWTP) aerobic anaerobic system as alternative wastewater treatment plant of washing jeans before discharging into the environment.
b. Total Suspended Solid (TSS) in the textile industry commonly high that is about 678 mg/L, while the aquatic environment only can receive TSS about 50 mg/L until 400 mg/L.

c. Wastewater sample with the wastewater volume 50 m^3/day and contain TSS 678mg/L.

d. TSS calculation resulting from experimental simulation.

3. RESULTS AND DISCUSSION

Wastewater Treatment Plant with the Aerobic Anaerobic System mostly found at hospital wastewater treatment which is more infectious than wastewater from other activities, as shown below

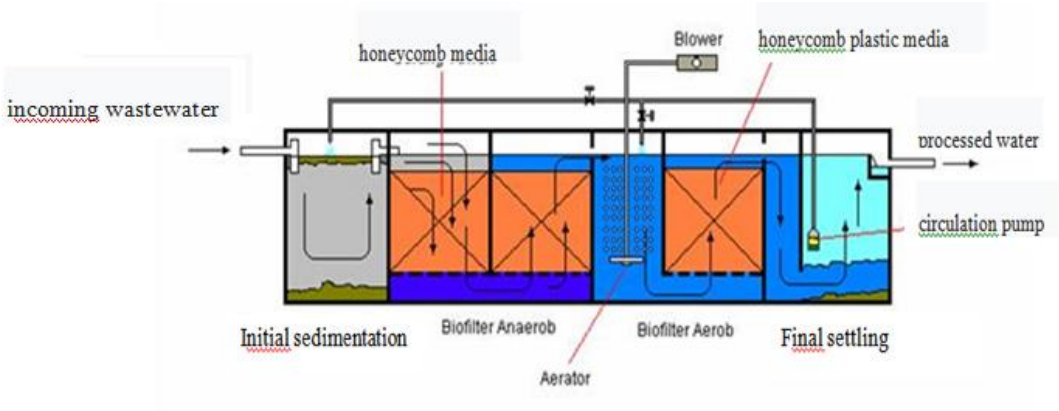

Figure 1. Anaerobic Aerobic WWTP

For discharger wastewater 50 m^3 and TSS = 50 mg/L

Table 1. Wastewater with TSS 50 mg/L

Name of Tub	DT (hour)	Efficiency (%)	Debit (m^3/day)	Effective volume (m^3)	Dimension			TSS results (mg/L)
					L(m)	W(m)	Height + Air (m)	
Like equalization	5.12	0	50	1,0	2,2	1	1,4	50
Initial sedimentation	3	25	50	10,7	3,3	4	2,4	37.5
Anaerob	9	80	50	6,3	0,7	4	2,4	7.5
Aerob	5.6	60	50	18,8	2,0	4	2,4	3
Final Sedimentation	3	0	50	6,3	0,7	4	6,3	**3**

Table 1 shows the early TSS was 50 mg /L, after receiving Aerobic Anaerobic WWTP constant in 3 mg / L <50 m / L (qualify for First-Class river quality standard according to PP 82/2001)

DOI: 10.31695/IJASRE.2020.33860

Table 2. Wastewater with TSS 150 mg/L

Name of Tub	DT (hour)	Efficiency (%)	Debit (m^3/day)	Effective volume (m^3)	Dimension			TSS results (mg/L)
					L(m)	W(m)	Height + Air (m)	
Equalization	5.12	0	50	1,0	2,2	1	1,4	150
Initial sedimentation	3	25	50	10,7	3,3	4	2,4	112.5
Anaerob	9	80	50	6,3	0,7	4	2,4	22.5
Aerob	5.6	60	50	18,8	2,0	4	2,4	9
Final Sedimentation	3	0	50	6,3	0,7	4	6,3	**9**

Table 2 shows the early TSS was 150 mg/L, after the wastewater treatment Aerobic Anaerobic WWTP constantly become 9 mg/L <50 mg/L (qualify for First-Class river quality standard according to PP 82/2001)

Table 3. Wastewater with TSS 250 mg/L

Name of Tub	DT (hour)	Efficiency (%)	Debit (m^3/day)	Effective volume (m^3)	Dimension			TSS results (mg/L)
					L(m)	W(m)	Height + Air (m)	
Equalization	5.12	0	50	1,0	2,2	1	1,4	250
Initial sedimentation	3	25	50	10,7	3,3	4	2,4	187.5
Anaerob	9	80	50	6,3	0,7	4	2,4	37.5
Aerob	5.6	60	50	18,8	2,0	4	2,4	15
Final Sedimentation	3	0	50	6,3	0,7	4	6,3	**15**

Table 3 shows the early TSS was 250 mg/L, after processed using Aerobic Anaerobic WWTP become 15 mg/L <50 mg/L (qualify for First-Class river quality standard according to PP 82/2001)

DOI: 10.31695/IJASRE.2020.33860

Table 4. Wastewater with TSS 500 mg/L

Name of Tub	DT (hour)	Efficiency (%)	Debit (m^3/ day)	Effective volume (m^3)	Dimension			TSS results (mg/L)
					L(m)	W(m)	Height + Air (m)	
Like equalization	5.12	0	50	1,0	2, 2	1	1,4	500
Initial sedimentation	3	25	50	10,7	3, 3	4	2,4	375.0
Anaerob	9	80	50	6,3	0, 7	4	2,4	75.0
Aerob	5.6	60	50	18,8	2, 0	4	2,4	30
Final Sedimentation	3	0	50	6,3	0, 7	4	6,3	**30**

Table 4 shows the early was TSS 250 mg/L, after processed by Aerobic Anaerobic WWTP constantly become 30 mg / L <50 mg/L (qualify for First-Class river quality standard according to PP 82/2001)

Table 5. Wastewater with TSS 678 mg/L

Name of Tub	DT (hour)	Efficiency (%)	Debit (m^3/ day)	Effective volume (m^3)	Dimension			TSS results (mg/ L)
					L(m)	W(m)	Height + Air (m)	
Like equalization	5.12	0	50	1,0	2,2	1	1,4	678
Initial sedimentation	3	25	50	10,7	3,3	4	2,4	508.5
Anaerob	9	80	50	6,3	0,7	4	2,4	101.7
Aerob	5.6	60	50	18,8	2,0	4	2,4	40.7
Final Sedimentation	3	0	50	6,3	0,7	4	6,3	**40.7**

Table 5 shows the early TSS was 678 mg/L, after processed by Aerobic Anaerobic WWTP constantly become 40,7 mg / L <50 mg/L (qualify for First-Class river quality standard according to PP 82/2001) From the above table, the following graph is obtained:

DOI: 10.31695/IJASRE.2020.33860

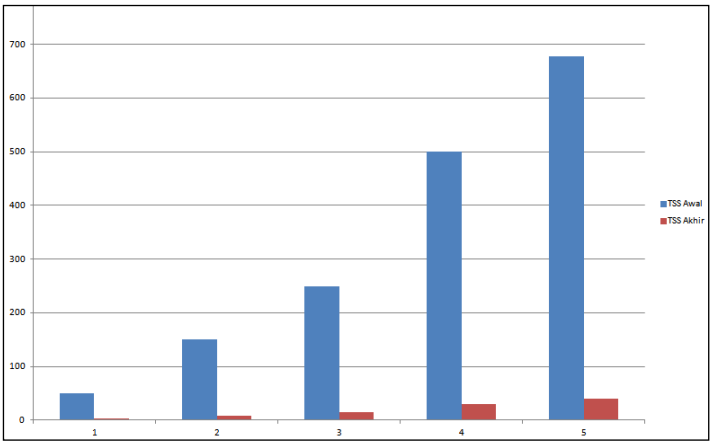

Fig.2 TSS relationship

From the figure 2 above there is significant relation between the early TSS and the final TSS which was so different around 6%

4. CONCLUSIONS

In a 50 m^3 debit of Textile Wastewater, an Initial TSS value that varies between 50 mg/L to 678 mg/L through the anerobic Aerobic WWTP becomes the Final TSS value to be discharged into the Environment to between 3 mg/L and 40.7 mg/L meets the standard Class I water quality from the Republic of Indonesia Government Regulation No.82 of 2001.

5. ACKNOWLEDGMENTS

On this occasion, we want to thank Ministry of Research and Technology and Director of Semarang State Polytechnic who has given us the opportunity to carry out Community Service activities in the second year.

6. BIBLIOGRAPHY

[1] Mochtar Hadiwidodo, Haryono Setyo Huboyo, Indrasarimmawati, 2019, *Color Reduction, COD and TSS of Textile Industry Wastewater Using Dielectric Barrier Discharge Technology with Variations in Oxygen Voltage and Flow Rate*, Presipitasi Jurnal Vol. 7 No.2 September 2009, ISSN 1907-187X

[2]. Suhartono,E dkk, 2019, *Final Report on PPPUD Surabayan Blue Jeans in Efforts to Export Through Environmental Management Cleaner, Green Products and Ecoefficiency in Surabaya, Wonopringgo District, Pekalongan Regency*, Polytecnic State of Semarang

[3]. Republic of Indonesia Government Regulation No.82 of 2001, 2001, *Regarding Water Quality Management and Water Pollution Prevention.*

[4]. SK Menteri LH No.115/2003 tentang Pedoman Penentuan Status Mutu Air.

[5] Ryadi, Slamet, 1984, Pencemaran Air , Penerbit Karya Anda Surabaya

[6]. Suhartono,E and Basuki,SB, 2015, Teknik Drainase Dan Pengelolaan Air Limbah Wilayah Perkotaan Pesisir,Badan Penerbit Polines, ISBN : 978-602-1673-09-6

DOI: 10.31695/IJASRE.2020.33860