

Eco Bricks Using Tannery Sludge

G. Divya¹, Gokul Vasam M E² & Sathya Narayanan G³

Associate Professor, Department of Civil Engineering, St. Joseph's College of Engineering, Chennai, India¹

UG Students, Department of Civil Engineering, St. Joseph's College of Engineering, Chennai, India^{2,3}

ABSTRACT: The tannery sludge is disposed by spreading it on the land or by land filling. Land filling might not be appropriate due to soil pollution, land limitation and land value. Presence of chromium in the tannery sludge causes skin cancer when it reacts with the environment. In this study, an attempt has been taken to add tannery sludge with clay in various proportions (5%, 10%, 15%, 20%, 25%) to make porotherm block in-order to use this tannery sludge in an effective way in construction industry, prevent soil pollution and land filling as well. The tannery sludge in powdered form is blended with clay and casted using mould manually. The mould is manufactured in such a way that it fits the dimension of porotherm block (16" X 6" X 8"). Tests are done on powdered tannery sludge to know its properties and if any sort of chemicals is above the permissible limit it is removed.

KEYWORDS: Tannery sludge, Porotherm block, Mould.

I. INTRODUCTION

Leather industry is one of the most polluting industries globally. The leather processing is responsible for unfavourable impact on environment. The production of leather in India is about 2 billion sq. ft. of finished leathers and the industry has set a target to double this figure in future with more number of consumption of meat and more production of leather clothes, wallets, bags and shoes which results in more waste generation. Tanneries in India are mainly located in four states namely Tamil Nadu, West Bengal, Uttar Pradesh and Punjab. There are nearly 900 tanneries in Tamil Nadu. This project deals with the manufacturing of porotherm blocks using tannery sludge. For thousands of years bricks have been made from clay. The tannery sludge could be a potential partial substitute for clay. It is very important that tannery wastes in the form of sludge are managed in an environmentally sound manner. The Pallavaram Tanners Industrial Effluent Treatment Co. Ltd (PTIET) located in Pallavaram, Chennai treats around 3 MLD of waste water from the tanneries. The resulting sludge weighs about 1.5 tonnes. The resulting sludge is disposed off-by spreading on the land or by land filling. However, for highly organized cities, sludge disposal by land-filling might not be appropriate due to land limitation as well as soil pollution. This project will lead to evaluate the suitability of sludge in partial replacement of clay in porotherm blocks. Properties of tannery sludge is found out by using standard test procedures.



Fig 1 Porotherm block

II. OBJECTIVE

- The objective of this paper is to determine optimum percentage combination of tannery sludge with clay in-order to attain maximum strength as well as permissible water absorption.
- To reduce soil pollution and amount of sludge land filled, use the tannery sludge effectively in the construction industry.
- To make the porotherm block economical so that all class of builders can afford it.

III. MATERIALS

3.1 Clay

Clay is the material which is used in construction industry for manufacturing bricks. The clay is brought from kancheepuram.

3.2 Tannery sludge

The tannery sludge is collected from Pallavaram Tanners Industrial Effluent Treatment Co. Ltd (PTIET).



Fig 2 Tannery sludge



Fig 3 Powdered Sludge



Fig 4 Clay

IV. TESTS CONDUCTED

4.1 CHNS analysis

Elemental analysis of carbon, hydrogen, nitrogen and sulphur is performed to provide carbonate and organic carbon and to get some idea of the composition of the organic matter. The total nitrogen, carbon, hydrogen and sulphur are determined using a CHNS analyzer, model NA 1500 from Carlo Erba Instruments. It is carried out mainly to know the organic content.

4.2 Volatile Solids & Fixed Solids

Volatile solids and fixed solids are carried out to know the volatile content and fixed content present in the tannery sludge.

4.3 pH

pH test is carried out to find the pH of tannery sludge. The value indicates us whether it is acidic or basic.

4.4 Heavy Metal Analysis

Heavy Metal Analysis is done to know the metal content as well as other chemical content in the tannery sludge.



Fig 5 Chemical test

V. CONCLUSION

Based on the experimental investigation on using tannery sludge as partial replacement with clay, the following observations can be drawn.

- 1) The addition of tannery sludge with clay results in same value in compressive strength as normal poortherm block with proper proportion.
- 2) The addition of tannery sludge in powdered form doesn't affects the environment as various tests are done to know its properties.
- 3) Thus, the optimum percentage of tannery sludge with clay is 20%.

VI. ACKNOWLEDGEMENT

The authors are thankful to St. Joseph's College of Engineering, Chennai – 600 119 for their support, guidance and encouragement throughout the entire project.

REFERENCES

- [1] Andrew Tarantola (March 06 2014) "How Leather Is Slowly Killing the People and Places That Make It". www.gizmodo.com/how-leather-is-slowly-killing-the-people-and-places-that-1572678618
- [2] Chakraborty S & Sarkar S k(1998). "Enzyme hydrolysis of solid tannery wastes: Solid-state enzyme production". J Soc Leather Technol Chem, 82 (1998)56-58.
- [3] Dr. M. Vijaya Sekhar Reddy, K. Ashalatha, K. Sasi. "Partial Replacement of Fine Aggregate by Tannery Shredded Waste in Concrete" Saudi Journal of Engineering and Technology.
- [4] Kanagaraj J, Rafiuddin Ahmd M, Jol Jyakumar Sundar V & Jayakumar R (2001) "Reactive proteinoid in tanning process", Indian pat 1063/DEI/2001,2001
- [5] Kumaraguru S, Sastry Tp & Rosec C,(1998) "Hydrolysis of tannery fleshings using pancreatic enzymes: Abiotechnological tool for solid waste management ", J Am Leather Chem Assoc, (1998), 32-38.
- [6] Mariappam, M (1997) "Environmental protection initiatives in Indian tanneries -A perspective view", Proc 30th Leather Res Ind Get Together (CLRI, Chennai), 151-161.
- [7] Prost J (1995) "Ecology and Environment in the Leather Industry"- Technical Handbook.
- [8] S Rajamani, E Ravindranath , SK Sarkar ,T Ramaswami." Major integrated Environmental system for relocation of 540 tanneries in Kolkata city" A biggest Environmental project of its kind in Asia, India.
- [9] Salman Zafar (January 27,2015) ."waste generation in tanneries" www.bioenergyconsult.com/waste-from-tanneries/
- [10] vijayaravind S ,Sathish Kumar V. (April-2015)"Utilization of tannery shredded waste as fine aggregate in concrete" International Journal of Engineering Research and Technology Vol. 4 Issue 04.
- [11] Swarnalatha S, Sekaran G, Srinivasulu T (November 2007) "Solid waste Management in Leather Sector by incineration " Central Leather Research Institute, Adayar , Chennai, India Vol.1, No.1