



KEMENTERIAN PENGAJIAN TINGGI



**LAPORAN INOVASI PITEX SESI JUN2020 UNIT
PENYELIDIKAN DAN INOVASI**

TAJUK PROJEK: TIMBERCRETE (SAWDUST BRICK)

JABATAN: KEJURUTERAAN AWAM

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TIMBERCRETE (SAWDUST BRICK)

Problem Statement

Nowadays, there are a few number of brick products available in the global market. These consist of concrete brick, sand brick, clay brick and etc. Those bricks are great and ideal options of material for building. They are popular for their versatility, as they can be found in lots of different designs. They can likewise last a long time. The problem statement of our project is disposal of timber products creates various environmental impacts especially in urban area. Commercial and industrial wastes, construction and demolition activities, pallets and packaging; and utilities are the main sources of urban wood wastes (Taylor and Warnken 2008). According to Allura (2014), the porousness of bricks used in construction can hold in moisture, especially during sustained rainy or humid weather. When moisture becomes trapped in the brick, it invites mold and fungus to grow. The issue will only continue to worsen, eventually lead to chips, cracks, and crumbling. Moreover, sand bricks are not as strong and durable compared to other bricks. (Deluca Masonry 2017)

In Malaysia, there are plenty of timber waste products such as sawdust, which can lead to social and environmental problem if the waste doesn't dispose properly. Moreover, the porousness of bricks used in construction can hold in moisture, especially during sustained rainy or humid weather. When moisture becomes trapped in the brick, it invites mold and fungus to grow. The issue will only continue to worsen, eventually lead to chips, cracks, and crumbling. Furthermore, Sand bricks are not as strong and durable compared to other bricks.

Methodology

methodology is the systematic, theoretical analysis of the methods applied to a field of study. It comprises the theoretical analysis of the body of methods and principles associated with a branch of knowledge. A methodology does not set out to provide solutions it is therefore, not the same as a method. Instead, a methodology offers the theoretical underpinning for understanding which method, set of methods, or best practices can be applied to a specific case, for example, to calculate a specific result.

Each step of project is a process to complete the project. Every step must be followed one by one and must be done carefully. If some errors occurs it can make the project probably could not operate or do not look neat and perfect. Before the project finish, various processes needs to be done according to proper procedures to ensure that projects do not have any problems.

The following are the steps of our project until complete the project. First and foremost, we identify the materials to be used for making the sample. The materials we used in our project is sand, mangrove sawdust waste, Portland cement, integral waterproofing compound, and lime. The next step is producing the product. We produced the product based on the fixed ratio. The ratio we used is cement: sand ratio 1:6 and cement: water ratio is 1:0.55. We produced product as per the procedure we planned earlier such as preparing mould, mixing of materials, compact the mixing into the mould, removing the brick from mould and let the brick in the oven for 48 hours to dry the brick 100% completely. After producing the product several tests conducted on the bricks to compare the saw dust brick with standard brick. If the test failed, the test will be repeated with different ratio. Tests conducted are Strength test and Water absorption test. After the test is done. Data of the test collected and analysed. Graphs and tables have constructed based on the data analysis. The final step is making conclusion. Conclusion is made based on the data and result collected.

Proposed Solution

1. Creativity:

Changing the use of sawdust to something more useful is that we use sawdust as a material in the manufacture of our products. This is to diversify the use of wood dust apart from being used for planting purposes, crafts and so on.

2. Product Quality and Value:

We have changed the materials used in brick making. Our products use lime, wood dust (sawdust), sand, cement, integral waterproofing compound and water based on the set ratio.

Benefits of the project

1. Environment

The result from this research, it can reduce the release of green gas widely into the atmosphere and can overcome the wood industry problem that is waste of wood dust. Hence, by recycling wastage materials such as sawdust and turn it into a new product it can help industry a lot from money management aspect because they can cut a lot of costs in production process by using wastage materials.

2. Economic

It is focused on the attraction of new businesses to people. This is critical to the country's growth and sustainability and assists us in building a strong and vibrant local community. The employment of talented people in the public, private, and non-profit sectors are fundamental to achieving this and leads to strong, sustainable economy.

3. Society

It is responsible for a host of job opportunities on the market today. There is a need for people with adequate expertise when it comes to sustainable solutions in the construction industry. The green technology is a developing market niche that is here to stay for many generations to come. As a result, many employment options come up for people like environmental health engineers. Moreover, it will make the community that using our product feel more safe than before because its helps to reduce emissions, reduces waste and consumes less energy than conventional technology.

4. Country

It has great potential in driving the country's development. By implementing this can provide employment opportunities for the local community. We can also explore export opportunities "green" products that we have produced. This will increase the country's economic

How to implement / Method of use

Our suggestion to use our product in constructing building. Timbercrete provides an attractive internal finish, again reducing the overall cost of construction. It can also be used to clad existing walls during renovations, with a relatively thin block that mounts to existing cement. In addition to housing, Timbercrete can also be used to build fences, retaining walls, garages and barbecues, as well as indoor fireplaces. From other perspective, the materials that we used to produce our product is safe to use and from recycle materials. So, from using it, we can prevent from exposing ourselves to the risk hazard environment.

Conclusion

To conclude, the quantity of sawdust used to produce bricks plays an important role because the weight of a sawdust brick lighter compare to sand brick. From that, we can say that timber brick is lightweight and low-cost composite as a building material. Lastly, we can conclude that the use of recycled materials can have many positive impacts on the environment, construction industry and society.

Appendices

Below are the data recorded for the bricks' weight using different percentages of sawdust such as 10%, 20% and 30% before and after placing the bricks into the oven for 48 hours.

BRICKS (10%)	WEIGHT OF BRICK BEFORE (KG)	WEIGHT OF BRICK AFTER (KG)	
		DAY 1	DAY 2
A1	1.92	1.84	1.84
A2	1.98		
A3	1.85	1.78	1.78
A4	1.85	1.78	1.77
A5	1.90	1.82	1.82
A6	1.78		
A7	1.77		
A8	1.86	1.79	1.78
A9	1.92	1.84	1.84

BRICKS (20%)	WEIGHT OF BRICK BEFORE (KG)	WEIGHT OF BRICK AFTER (KG)	
		DAY 1	DAY 2
B1	1.53	1.37	1.37
B2	1.55	1.38	1.38
B3	1.52	1.37	1.37
B4	1.63	1.45	1.45
B5	1.45		
B6	1.61	1.43	1.43
B7	1.57		
B8	1.67	1.47	1.47
B9	1.40		

BRICKS (30%)	WEIGHT OF BRICK BEFORE (KG)	WEIGHT OF BRICK AFTER (KG)	
		DAY 1	DAY 2
C1	1.47	1.32	1.81
C2	1.26	1.14	1.13
C3	1.47		
C4	1.44	1.29	1.28
C5	1.40	1.26	1.25
C6	1.40	1.24	1.24
C7	1.40		
C8	1.37	1.22	1.22
C9	1.32		

Below are the pictures taken during the making of our product

1. PICTURES OF PREPARING THE MOULD



2. PICTURES OF PREPARING MATERIALS FOR MAKING THE PRODUCT



3. PICTURES OF MAKING THE PRODUCT





4. PICTURES OF DRYING THE BRICK

