

EFFECTIVE UTILIZATION OF MOTHERBOARD AS WALL TILES

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Abstract – Through this project we experiment E-Waste as wall tiles, waste Motherboards are used as specific method of disposing the E-waste, then replaced ordinary ceramic tiles by waste PCB (Printable circuit board) on mother board. Mother boards are cleaned to remove the external parts. Then the PCB boards are coated with paint for sufficient finishing and good appearance. And last it is to be placing on the interior portion of the wall. Placing is to be done by using the cement mortar. We obtained satisfactory results in the form of wall decorating tiles and it minimizes Electronic waste. It control pollution cost by E-waste. It is initial process and low level of production so the cost of E waste tile is increases but after the increases of production in some years to minimize the cost and also simple process.

Key Words: Wall tiles, E-Waste, Motherboard, Cement mortar, Pollution.

1. INTRODUCTION

In developing countries, the E-waste has major handling challenges issues. In the last 10 to 15 years, rapid growth and technology changes in electronics have led to an increasing turnover of computers, tablets, phones, display screens, printers and other electronics. Consequently, businesses and households have seen steady growth in the volume of their electronics needing safe and cost - effective end-of-life management. Electronics being disposed of are commonly referred to as e-waste. Most of the e-scrap contains printable circuit board which consist of approximately 27% metals, made up mainly of aluminum, copper, lead, iron and tin, as well as other heavy metals such as nickel and cadmium. Hence by processing the E-waste, valuable materials are recovered and waste minimization is achieved.

1.1 DEFINITION OF E-WASTE

E-waste is any electrical equipment and electronic equipment that's been wasted; this includes not working devices and broken equipments that are thrown as garbage. Often, if the devices or equipments that goes unsold electronic devices are reserved and it will be thrown away. Finally, it is harmful due to dangerous chemicals naturally when buried inside into the ground leach from the metals that inside.

1.2 TYPES OF E-WASTE

Generate e waste in many ways as a type of electronic devices like monitors, television, mouse, keyboard, laptops, CPU, audio and video devices, and other personal electronic devices. It has PCB as a type of motherboard for workability of devices. After the usage of devices cannot to be reuse and waste generate in large quantity of India.

1.3 METHOD OF DISPOSAL OF E-WASTE IN INDIA

- ❖ INCINERATION,
- ❖ LANDFILLING,
- ❖ RECYCLING OF E-WASTE,
- ❖ REUSE OF ELECTRONIC DEVICES,
- ❖ RECOVERY AND REUSE.

1.4 DRAWBACKS OF E-WASTE DISPOSAL

- ❖ Recycling tons of garbage will require separate factories.
- ❖ Recycling will produce pollutants, including chemical stews after breaking down the waste materials.
- ❖ Recycling is not always cost-efficient.
- ❖ Recycling can increase low quality jobs.
- ❖ Recycling can create more environmental problems, if not done right.
- ❖ Recycling does not guarantee good quality products.

1.5 OBJECTIVE

- ❖ The aim is the disposal of unwanted electronic gadgets compared to the past days the e-waste products or items have increased abundantly now days.
- ❖ The recycling of e-waste serves a lot of useful purposes.

- ❖ In this project mainly for Reuse of motherboards.
- ❖ This process should be minimizing the E-waste.
- ❖ Use electronics or electrical products which are design for reuse, resale, refurbishment, salvage recycling through material recovery.

2. E-WASTE GROWTH



Fig – 1: YEARWISE E-WASTE GROWTH IN INDIA

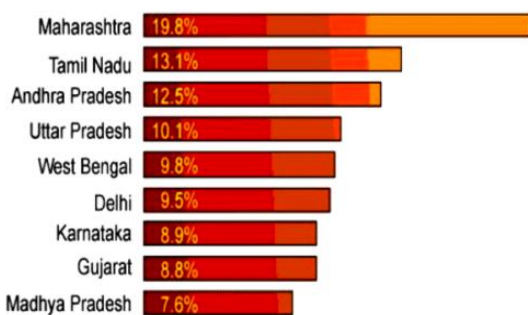


Fig – 2: STATEWISE E-WASTE GROWTH IN INDIA

3. METHODOLOGY

In this research work first we collect the literature and journals to the related topics. Then the collect the e-waste such as motherboard from the local computer service centres. Then we convert the e-waste to make wall tile. And the final product is a tested as per IS code 13630. For tiles the flexural strength is determine as per IS code 13630 part I – 2006, Water absorption test is determined as per IS code 13630 part II – 2006 and Bonding test is determined as per code part VIII – 2006. The paint such as primer and color coat are applied to the surface of a mother board. And the finally pasted the e-waste tiles on the wall surface, by using cement mortar.

4. MATERIALS AND METHODS

4.1 MATERIALS

4.1.1 SAND

Sand particles consist of small grains of silica (SiO₂). It is formed by the decomposition of sand stones due to various effects of weather. Size of particle between 4.75 mm and 0.15 mm is called fine aggregate; it is used for making concrete, mortars and plasters. It is also used for filling under floor and basements. Due to increased construction activity, natural sand is becoming more difficult to get. Hence, alternative materials like crushed rock and fly ash are used in construction.

4.1.2 CEMENT AND MORTAR

The cement product is manufacture by burning and crushing to powder either stone containing 1/5th or 2/5th clay and remaining carbonate of lime or an intimate mixture of well proportioned calcareous and argillaceous materials is called cement. Calcareous materials are limestones, marl, chalk and shells etc. Argillaceous materials are silica, clay, oxide of iron etc. commonly used cement for normal construction work is ordinary Portland cement.

Mortar is a mixture of binding material like cement and an inert material or fine aggregate like sand. It is used as binding material in tiles, as a covering material to walls in the form of plaster to provide a smooth, hard and decorative surface.

4.1.3 MOTHERBOARD

A Motherboard is generally a printed circuit board (PCB). It is a computer's central communications backbone connectivity point, through which all components and external peripheral connect. Motherboard include the following primary components, are CPU, memory, storage interface, ROM BIOS, Northbridge chipset, Southbridge chipset, cooling fans, peripheral connector slots, connectors for peripheral devices, backup battery and the power connector.

4.1.4 TYPES OF PRINTED CIRCUIT BOARD

- Single Sided PCB
- Double Sided PCB
- Multilayer PCB
- Rigid PCB
- Flex PCB
- Rigid-Flex PCB

4.1.5 TILES

Tiles are thin slabs either rectangular or square, used for covering hard wearing roofs or flooring with the

support of cement mortar. Lightweight materials are used for wall and ceiling applications.

4.1.6 TYPES OF TILES

- CERAMIC TILE,
- PORCELAIN TILE,
- QUARRY TILE,
- TERRACOTTA TILE,
- NATURAL STONE TILE,
- TRAVERTINE TILE,
- MARBLE TILE,
- SLATE TILE.

4.1.7 CLASSIFICATION OF TILE ACCORDING TO PURPOSE OF PLACING

- FLOOR TILE,
- CEILING TILE,
- WALL TILE,
- ROOF TILE.

4.2 METHODS

4.2.1 COLLECTION OF MOTHERBOARD

Availability of motherboard as a waste in enormous quantity present in local computer service centres. We having a 25 numbers of waste motherboards collected from local shops. A small quantity of e waste motherboard is collected for research purpose when it to be success will collect in more quantity to our project.



Fig - 3: MOTHERBOARD

4.2.2 CLEANING OF MOTHERBOARDS

The components of resistors, capacitor, copper, slots, processor, battery and other components are present on the surface of board. The components are present in board is not to be appearance of tile to be seen. First the components are to be removed and the plain board will to be get.



Fig - 4: CLEANING OF MOTHERBOARD

4.2.3 SMOOTHENING OF BOARDS

After the process of cleaning the board is visible and appearance in rough surface in both sides. So the smooth surface by the equipment of grinding machine used, Emery sheet by use handmade to this work for shine.



Fig - 5: SMOOTHENING OF BOARDS

4.2.4 EFFECTIVE COAT



Fig - 6: PRIMER COAT

4.2.5 FIXING THE TILES



Fig - 7: FIXING THE TILES

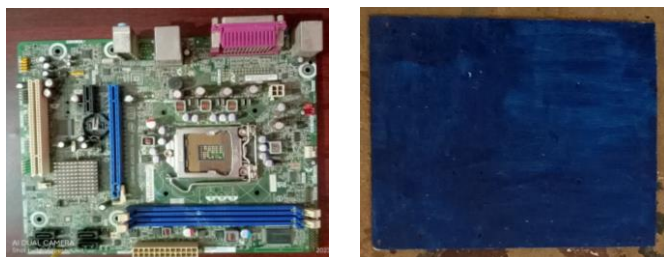
5. RESULT AND DISCUSSION

5.1 FINAL FINISH



Fig - 8: FINAL FINISH

5.2 BEFORE AND AFTER PICTURE



BEFORE

AFTER

Fig - 9: BEFORE AND AFTER PICTURE

5.3 TEST FOR TILES

5.3.1 WATER ABSORPTION TEST

- ❖ Water Absorption of E-Waste tiles is **1.78 %**
- ❖ Water Absorption of ceramic tiles is **37.06 %**

CERAMIC TILES	E-WASTE TILES
0.710 - 0.518	0.114 - 0.112
TILES = ----- x 100	PCB = ----- x 100
0.518	0.112
= 37.06 %	= 1.78 %

5.3.2 FLEXURAL TEST

- ❖ Flexural strength of E-Waste tiles is **55.13 Kg/mm.**
- ❖ Flexural strength of ceramic tiles is **35.34 Kg/mm.**

CERAMIC TILES	E-WASTE TILES
7069	12130
Flexural = -----	Flexural = -----
strength 200	strength 220
= 35.34 kg/mm	= 55.13 kg/mm

5.3.3 BONDING TEST

Normally wall tiles are bonded with wall by using cement mortar of ratio 1:2 as per IS code 13630. As same as E-waste tiles also bonded with CM 1:2, the quality of bonding is exposed by this mix ratio when compared to normal tiles bonding. Before placing the tiles, the area should be patched for better bonding result.



Fig - 10: BONDING TEST

5.4 TEST FOR BONDING MATERIALS FOR CEMENT AND SAND

5.4.1 SPECIFIC GRAVITY OF CEMENT

The Specific Gravity of Cement is **3.08**



Fig - 11: SPECIFIC GRAVITY OF CEMENT

5.4.2 SPECIFIC GRAVITY OF FINE AGGREGATE

- ❖ The Specific Gravity of Sand is **2.40**

5.4.3 SIEVE ANALYSIS OF FINE AGGREGATE

- ❖ The sand is generally passing through **4.75mm IS sieve and retaining in 2.36 IS sieve is 1.5,**
- ❖ The cumulative value of sand is **98.50** and its present in **zone II.**

5.4.4 CONSISTENCY OF CEMENT

- ❖ The Consistency of Cement is **34 %**

5.4.5 INITIAL SETTING TIME

- ❖ The Initial Setting Time of Cement is **30 minutes.**

6. CONCLUSIONS

With this project, there is a proper and perfect alternating solution for reusing of E-waste in simplest and cost effective way. The new creative wall tile is carried out successfully with the standard specifications. The characteristics and properties of E-waste tiles are better than the normal tiles and cost of the E-waste tile is give pleasant look when compared to normal wall tile. In future it will reduce by increasing in large level of production. And it will be a good solution for reducing the E-waste.

7. REFERENCES

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