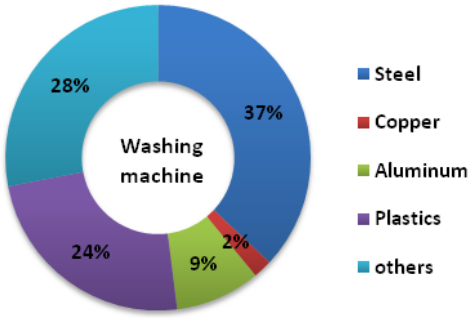
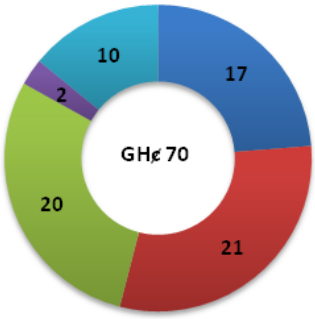
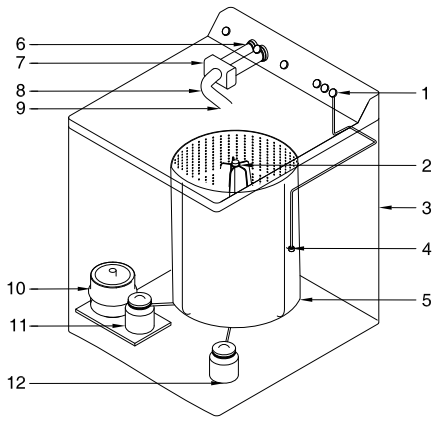
Material Composition



Scrap Value In Agbogbloshie



Washing Machine



1. Timer Control
2. Agitator
3. Stainless Steel Covering
4. Water Level Control Assembly
5. Tub
6. Water Supply Hoses
7. Water Inlet Valve
8. Supply Hose to Tap
9. Stainless Steel Covering
10. Spin Pulley
11. Water Pump

Washing Machine Overview

Common Brands:
Asko, Bosch, LG, Miele, Samsung, Siemens, Speed queen, and Whirlpool

Hazardous Materials:
Brominated flame retardants (BFRs), lead (Pb), mercury (Hg), polychlorinated biphenyl (PCB)

Key components/parts:
Casing, electric motor, printed circuit board & tub

Primary materials:
Aluminium (Al), copper (Cu), glass, steel

Types:
Front-loading and Top-loading

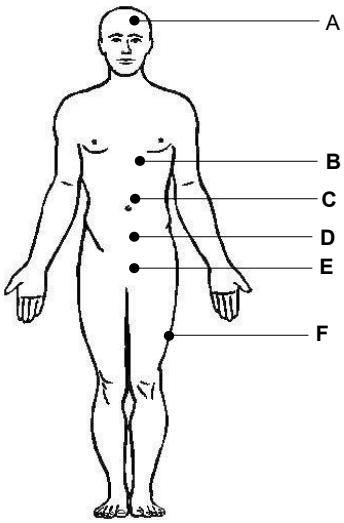
Weight composition (%):
9% Aluminium, 2% copper, 37% steel, 24% plastics, 28% others [1]

⚠ **Brominated flame retardants (BFRs), lead (Pb), mercury (Hg), are highly hazardous to human health and the environment and hence, recycling processes should take cognissance and prevent damage.**

Urban Mining

The outer case and majority part of a washing machine are made of steel, coated with zinc to protect the steel against corrosion (rust). The inner tub of some models is made of stainless steel. The tub guard, water pump and the drum housing are made from plastics like blends of acrylonitrile butadiene styrene (ABS) and polycarbonate.The plastics can also be grounded into small pieces for reuse. Note: The smaller the better.
The electric motor and the cables contain copper. Cast aluminium is used to form the transmission. to convert the alternating current supplied by the transformer to direct current. And there is also a fan which blows out the hot air from the chamber. The steps involved in taking the parts include:

Health



A. Nervous System
B. Respiratory system
C. Immune system
D. Urinary system
E. Reproductive system
F. Skin

Health Hazards

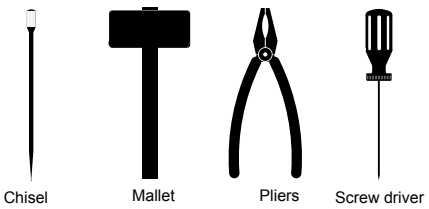
Lead (Pb) - Anaemia, kidney and brain damage, infertility (in men and women), cancer, headache and behaviour disruption of children.
Polychlorinated biphenyl (PCB) - Liver & immune system damage, cancer, damage to the nervous system, and infertility.
Mercury (Hg) - Brain and DNA damage, disruption of nervous system, sperm damage, birth defects, skin rashes and headaches.

Safety Gear

The disassembly process exposes the worker to various levels of potential harm. There is a need for protective gear to reduce impact of these practises. Safety gear include gas masks to protect e-waste workers from dust and toxic gases, safety boots, hand gloves and mostly HazMat suits, which are full garments with footwear and masks, worn to protect workers from dangerous chemicals.

Tools For Disassembly

The tools required for processing: chisel, mallet, pliers,screwdriver, and wire cutters.



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⚠ **Tools are a potential source of injury. The risk can drastically be minimised by using the right tool for the right job. In the process of disassembling washing machines, the highest risk to workers especially in Agbogbloshie is the risk of injury from handling the mallet and the chisel.**

Step by Step Disassembly

1. All copper wires are cut off and separated. Take out the switches carefully.
2. Then the motor, located at the back is carefully removed.
3. By using mallet, spanner and screws, the outer casing (steel) is removed.
4. The parts made of plastics such as the water tubes, soap drawer and drum housing, are then removed by unscrewing the bolts.
5. The tub and agitator parts are also taken apart.
6. Isolate the parts according to the type of material.
7. After disassembly, components should be documented via photography and labelling.

⚠ **Brominated flame retardants (BFRs), lead (Pb), mercury (Hg), are highly hazardous to human health and the environment and hence, recycling processes should take cognissance and prevent damage.**

washing machine tub

front load washer

washing machine pulley

concrete block balance

stainless steel covering

Re-make

Most scrap parts of a washing machine are valuable. The scrap metals can be sold to recycling companies and metalwork industries, where such parts are remelted and reformed.
Examples of such remake projects are shown here.

Barbecue/grill stand, constructed out of a washing machine drum. Perforations enhance combustion of fuel.

Lighting fixture made out of washing machine drum,

Made in Agbogbloshie

In Agbogbloshie, the stainless steel covering washing machines are used for coal pots and other household items.

References & Notes

1. http://www.product-life.org/chart/wm1.gif

2. http://www.lenntech.com/periodic/periodic-chart.htm

3. http://www.epa.gov/ttn/atw/hlthef/vinylchl.html

***Calculation on estimated value:**
Prices of materials vary in Agbogbloshie depending on the local market. Also the state of the materials also influences the price, that's the price of burnt copper differs from that of the unburned by 1 Ghana cedis per pound. In Agbogbloshie, copper and aluminium are weighed in pounds (lbs) and iron/steel is weighed in kilograms (kg). The prices we used in this calculation are that charged as at July, 2014.

Calculation inputs:
Total weight of equipment (W): 35 kg
Weight percent of material (W%): %
Weight of material (Wm): W% * W:
Price per material = Wm * amount in GHC per kg
(1 kg = 2.204 pounds)

** These types of EEE are mostly found and dismantled in Agbogbloshie.

For more information, visit:
http://qamp.net/washing machine

What is a Washing Machine

A washing machine is an electronic appliance used for washing clothes. To use a washing machine, key parameters are set by the user the total, including number/weight of the clothes, the temperature of operation during the wash-rinse cycle and the duration of operation. The washing machine has an electric motor fixed to a concrete slab set at the base, which accounts for its heavy weight.

How it works

A washing machine consists of components like: the agitator, water feed tube, electric motor, drive, wash tubs, and hose. Inside the tub, is the agitator which plays an important role in a washing cycle. The agitator is made of steel that is perforated on its sides. The agitator allows water to leave the tub during the washing cycle. It works by rotation powered by an electric motor. The rotation induces current and the clothes are made to rub against one another. This results in the removal of dirt from the clothes.

Washing Machines

AMP

Agbogbloshie Makerspace Platform