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Design & Manufacturing of Reduce, Reuse & Recyclying Machine

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Abstract—*The amount of household garbage has increased significantly. The use of plastics has also increased substantially since the 1930s—by a factor of five! Plastics and metals make up 15 percent of the contents of household garbage. This represents valuable material made from mineral oil that is then destroyed in waste incineration plants.*

Every year hundreds of thousands of tons of plastic end up as garbage and disposed of in incineration plants. Only around one tenth is recycled. There is growing dissatisfaction amongst the population about this situation. This is reflected, for example, in the numerous discussions held and initiatives launched at a political level, ranging from higher reuse quotas to the banning of plastic bags.

The use of plastic is growing in a wide range of industries, and it is increasingly replacing materials such as wood, metal, or glass. This inevitably leads to a growth in the amount of waste. This gives rise to a legitimate question, from a climate policy perspective as well: for which plastics would a second life from recycling make real sense.

The garbage consists of hard materials and perishable materials and water

Land treatment has been used for years to segregate water, cuttings and oil so that soluble salt content is decreased, oil concentration is reduced by recovery or degradation, and clean cuttings or reuse materials can be separated and stored in secure onsite stockpiles and landfills. What's new about the r3 process is that converting the reuse material to road base and levee fill can safely transform an otherwise waste material to a reusable product

Keywords: *welding, grinding, drilling, turning, filling, bending.*

1. INTRODUCTION

Reduce, reuse and recycle is a concept that people everywhere are starting to understand and apply to everyday life. Its principles are quite basic, but are a necessity for maintaining a sustainable life. To remain productive, reducing one's intake of energy and materials is vital. The toxicity of trash is at an all time high and the only way to stop this is by preventing waste from the very beginning of its life. The concept of reuse is applied by reinventing items after their initial life and avoiding additional waste by all means necessary. Though the concept of reuse is very important to the lifecycle of a material, there are times when a second life simply cannot be created for a certain item. However, when one does have to throw an item away; an important proactive strategy is to buy products that can be recycled or, at the very least, determine in advance the product is an alternative to a similar, less recyclable material. Recycling is the process of turning items considered to be waste into a valuable resource. This process does include many steps, but begins with taking items such as cans, glass, newspapers or plastic to a recycle bin or collection facility. The more often individual users partake in this practice by consciously making themselves aware of an item's recyclability, the easier the entire process will be for the rest of the world. This ease will simply create a higher demand for recycled products and will be more of an incentive for large companies and corporations to use and buy recycled products, making the entire process more successful and stress free. These simple ideas of reduce, reuse, recycle are just the beginning of challenging ourselves in preserving our environment, but extremely essential in ensuring the success of conservation.

2. SPECIFICATIONS

Frame specification

Height –75cm

Length –30cm

Breadth –30cm

Weight –30kg

Sprocket specification

No of sprockets- 3 sprockets of 32 teeth each

PCD for 32 teeth sprockets -11 cm

No of sprockets – 3 sprockets of 42 teeth each

PCD for 42 teeth sprockets- 15.0 cm

Chain drives

First chain drive distance = 45 cm

First chain length = 100 cm

Second chain drive distance = 35 cm

Second chain length = 80 cm

Third chain drive distance = 20 cm

Third chain length = 50 cm

Mesh plate

Number of holes per square inch = 13 holes

No of mesh plates = 1

Spring

Coil diameter =3 cm

Helix diameter = 1.5 cm

No of spring = 1

Pedestal bearing

Inner diameter = 2cm

Distance = 10cm

No pedestal bearing = 2

Shafts

Length of the shaft = 30 cm

Diameter of the shaft = 20 cm

No. of shafts = 3

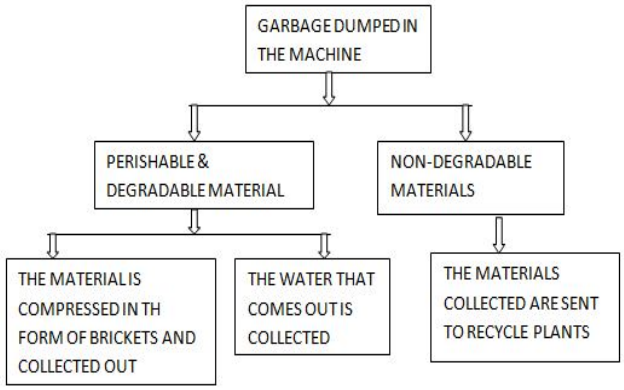
3. EXPERIMENTAL SET UP

Reduce, reuse, and recycle commonly known as the 3rs. The main reason why the 3R's are practiced is so that the treatment of waste via incinerating and landfill can be minimized. Although some incinerating plants can make use of the energy from the waste to generate energy, it will release harmful greenhouse gases into the atmosphere, one of them being carbon dioxide. Ashes produced from the incineration will also be highly toxic. Landfill may be a useful method for disposal of rubbish in countries that have large areas. However, it will be a very bad idea for small countries like singapore to adopt because of its much smaller area. By practicing the 3R's, there is a reduced need for mining of raw materials which will require energy as well as result in the depletion of earth's resources.

The main aspects of the 3r's are:

- Prevent pollution created by manufacturing new products or products made from virgin materials.
- Save energy in manufacturing, transportation, and disposal of products.
- Decrease greenhouse gas emissions, which contribute to global climate change.
- Conserve natural resources such as timber, water, metals, and fossil fuels.
- Reduce the need for landfilling and incineration, which are expensive to operate and maintain.
- Protect and expand u.s. manufacturing jobs and increase u.s. competitiveness.
- Help sustain the environment for future generations.

4. WORKING EXPLANATION BY FLOWCHART



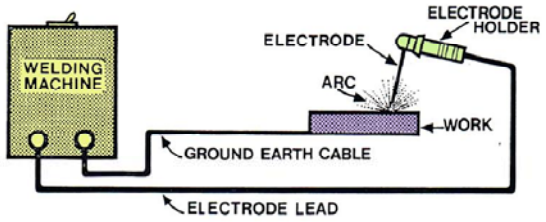
In the first stage, the garbage is dumped into the machine. The garbage is then separated in this section into the perishable and non perishable materials. The perishable materials are sent into the second compartment. In the second stage, the garbage that comes from the first stage, is squeezed in the form of brickets. The moisture content is removed when the garbage is squeezed. The bricket is collected out and kept in sunlight to get completely dried. The water that comes out after squeezing is collected in the third stage. The water and the non-degradable materials are collected out separately. The non-degradable materials are sent to the respective recycling plants and the water can be filtered and can be used to water trees.

5. WELDING

Welding is the process of joining similar metals by the application of heat, with or without application of pressure or filler metal, in such a way that the joint is equivalent in composition and characteristics of the metals joined. In the beginning, welding was mainly used for repairing all kinds of worn or damaged parts. Now, it is extensively used in manufacturing industry, construction industry (construction of ships, tanks, locomotives and automobiles) and maintenance work, replacing riveting and bolting, to a greater extent.

Electric arc welding

Arc welding is the welding process, in which heat is generated by an electric arc struck between an electrode and the work piece. Electric arc is luminous electrical discharge between two electrodes through ionized gas.



Any arc welding method is based on an electric circuit consisting of the following parts:

A. Power supply (ac or dc);

B. Welding electrode;

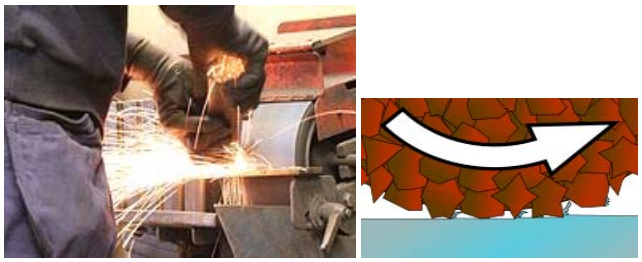
C. Work piece;

D. Welding leads (electric cables) connecting the electrode and work piece to the power supply.

Electric arc between the electrode and work piece closes the electric circuit. The arc Temperature may reach 10000°f (5500°c), which is sufficient for fusion the work piece edges and joining them. When a long joint is required the arc is moved along the joint line. The front edge of the weld pool melts the welded surfaces when the rear edge of the weld pool solidifies forming the joint. Transformers, motor generators and rectifiers' sets are used as arc welding machines. These machines supply high electric currents at low voltage and an electrode is used to produce the necessary arc. The electrode serves as the filler rod and the arc melts the surface so that, the metals to be joined

Are actually fixed together. Sizes of welding machines are rated according to their approximate amperage capacity at 60% duty cycle, such as 150,200,250,300,400,500 and 600 amperes. This amperage is the rated current output at the working terminal.

6. GRINDING



Grinding is an abrasive machining process that uses a grinding wheel as the cutting tool. A wide variety of machines are used for grinding:

1. Hand-cranked knife-sharpening stones (grindstones).
2. Handheld power tools such as angle grinders and die grinders.
3. Various kinds of expensive industrial machine tools called grinding machines.
4. Bench grinders often found in residential garages and basements.

Grinding practice is a large and diverse area of manufacturing and tool making. It can produce very fine finishes and very accurate dimensions; yet in mass production contexts it can also rough out large volumes of metal quite rapidly. It is usually better suited to the machining of very hard materials than is "regular" machining (that is, cutting larger chips with cutting tools such as tool bits or milling cutters), and until recent decades it was the only practical way to machine such materials as hardened steels. Compared to "regular" machining, it is usually better suited to taking very shallow cuts, such as reducing a shaft's diameter by half a thousandth of an inch or 12.7 μm.

Grinding is a subset of cutting, as grinding is a true metal-cutting process. Each grain of abrasive functions as a microscopic single-point cutting edge (although of high negative rake angle), and shears a tiny chip that is analogous to what would conventionally be called a "cut" chip (turning, milling, drilling, tapping, etc.). Similar abrasive cutting processes are lapping and sanding.

7. DRILLING

Drilling is a cutting process that uses a drill bit to cut or enlarge a hole of circular cross-section in solid materials. The drill bit is a rotary cutting tool, often multipoint. The bit is pressed against the work piece and rotated at rates from hundreds to thousands of revolutions per minute. This forces the cutting edge against the work piece, cutting off chips from what will become the hole being drilled. Exceptionally, specially-shaped bits can cut holes of non-circular cross-section.

Drilled holes are characterized by their sharp edge on the entrance side and the presence of burrs on the exit side (unless they have been removed). Also, the inside of the hole usually has helical feed marks.

Drilling may affect the mechanical properties of the work piece by creating low residual stresses around the hole opening and a very thin layer of highly stressed and disturbed material on the newly formed surface. This causes the work piece to become more susceptible to corrosion at the stressed surface. A finish operation may be done to avoid the corrosion. Zinc plating or any other standard finish operation of 14 to 20 μm can be done which helps to avoid any sort of corrosion. When possible drilled holes should be located perpendicular to the work piece surface. This minimizes the drill bit's tendency to "walk", that is, to be deflected, which causes the hole to be misplaced. The higher the length-to-diameter ratio of the drill bit, the higher the tendency to walk.

8. TURNING

Turning is a machining process in which a cutting tool, typically a non-rotary tool bit, describes a helical tool-path by moving more or less linearly while the work piece rotates. The tool's axes of movement may be literally a straight line, or they may be along some set of curves or angles, but they are essentially linear (in the nonmathematical sense). Usually the term "turning" is reserved for the generation of external surfaces by this cutting action, whereas this same essential cutting action when applied to internal surfaces (that is, holes, of one kind or another) is called "boring". Thus the phrase "turning and boring" categorizes the larger family of (essentially similar) processes. The cutting of faces on the work piece (that is, surfaces perpendicular to its rotating axis); whether with a turning or boring tool, is called "facing", and may be lumped into either category as a subset.

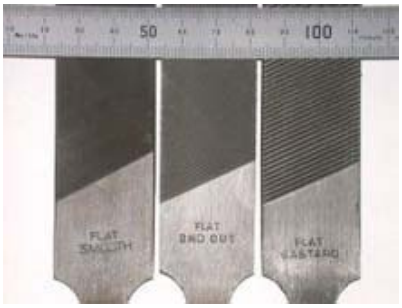
Turning can be done manually, in a traditional form of lathe, which frequently requires continuous supervision by the operator, or by using an automated lathe which does not. Today the most common type of such automation is computer numerical control, better known as cnc. (cnc is also commonly used with many other types of machining besides turning.)

9. FILING

A **file** is a metalworking, woodworking and plastic working tool used to cut fine amounts of material from a work piece. It most commonly refers to the hand tool style, which takes the form of a steel bar with a case hardened surface and a series of sharp, parallel teeth. Most files have a narrow, pointed tang at one end to which a handle can be fitted.

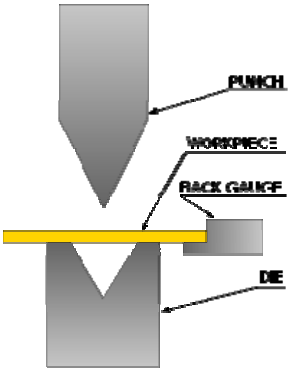
A similar tool is the rasp. This is an older form, with simpler teeth. As they have larger clearance between teeth, these are usually used on softer, non-metallic materials.

Related tools have been developed with abrasive surfaces, such as diamond abrasives or silicon carbide. Because of their similar form and function, these have also been termed 'files'



10. BENDING

Bending is a manufacturing process that produces a v-shape, u-shape, or channel shape along a straight axis in ductile materials, most commonly sheet metal.[1] commonly used equipment includes box and pan brakes, brake presses, and other specialized machine presses. Typical products that are made like this are boxes such as electrical enclosures and rectangular ductwork.



11. THE TYPE OF MECHANISMS USED

Screw-jack mechanism

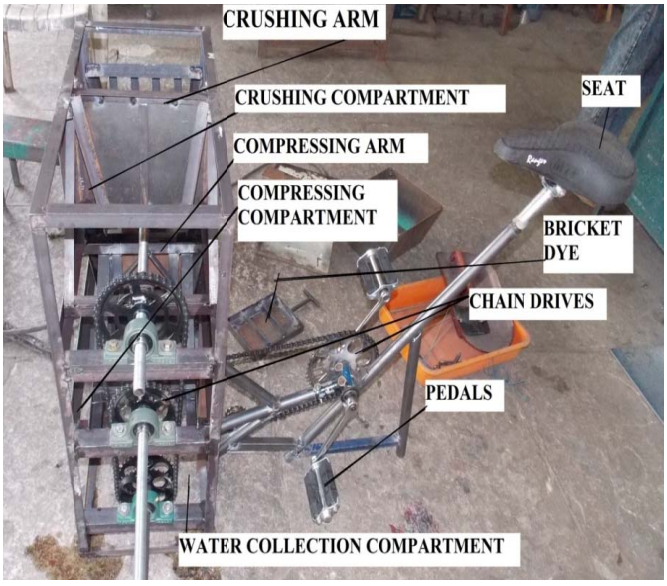
Spring mechanism

Simple gear mechanism

12. TYPESOF WASTE

Food, Green (garden) waste, Glass, Metals, Paper and card, Plastics, Textile

13. ACTUAL VIEW OF MACHINE



14. CONCLUSION

The 3 R's are concerned with better resource efficiency in accordance with the following principles:

Reduce – eliminating the generation of waste, where possible by stopping it coming on to site in the first place.

Reuse – making use of materials in their original state on the same site or at other sites.

Recycle – turning materials into new products for other purposes.

Our project reduces the amount of waste generated, reuses the materials that can be still brought in to use and recycle's the waste products by sending them to the respective recycling units. We are reducing the waste in the first section. Here the waste that is dumped is segregated in the terms of perishable and non perishable materials by using a pressing arm that presses the perishable materials into the second section. This pressing arm gets its power to press by the simple gear mechanism and gear & pinion mechanism and this arm moves in forward and backward direction over the mesh plate and presses the garbage over it. The perishable materials are sent to the second section and the non perishable materials are collected separately and sent to respective recycling units.

In the second section, the perishable waste materials that comes from the first section is compressed or squeezed using a compressing arm which gets power to squeeze the material by the same mechanism used in the first section. The perishable materials get squeezed and the moisture from the waste if any is removed and collected separately in the third section. The waste which is squeezed in second section is collected in the form of small brickets and then put under sunlight to get completely dried up. These brickets can be used for burning as fuel and also as manure in the agricultural fields. The water that is collected in the second section can be purified and can be used to water the plants.

Individually the waste or the garbage produced can also be reduced by adapting and following concepts of the 3 R's

15. FUTURE MODIFICATIONS

- Motor can be used to generate more power
- The project can be made movable
- The size of the project can be increased

The machine can be re-designed and modified to make the design and construction of it simpler and cheaper. This would help to increase the efficiency and the cost effectiveness of the machine.

REFERNCES

[1] www.wrap.org.uk/rcproducts
[2] www.greenspec.co.uk
[3] www.ciria.org/recycling
[4] www.aggregain.org.uk