

DESIGN AND FABRICATION OF A4 MANUAL PAPER SHREDDER

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ABSTRAK

Tujuan utama projek 'paper shredder' ini ialah memberi pelajar pengalaman bekerja dengan sendiri . Pembelajaran di dalam bidang pembuatan adalah sangat penting untuk memastikan pelajar memahami apa yang harus dibuat di dalam projek ini. Projek ini adalah mengenai merekabentuk dan menghasilkan 'paper shredder'. Projek ini melibatkan proses merekabentuk sebuah 'paper shredder' dengan mengambil kira bentuk, ciri-ciri istimewa dan juga kelebihanannya dalam membantu para pelajar di dalam proses pembelajaran mereka. Setelah rekaan yang ingin dihasilkan siap, ia akan ditukarkan kepada produk yang sebenar di dalam proses penghasilan dimana rekaan tadi akan dijadikan sebagai panduan. Kebanyakan cara dan proses yang terlibat dalam proses penyambungan bagi projek ini adalah menggunakan proses *rivet*. Setelah kesemua proses yang terlibat di dalam projek ini selesai, 'Paper shredder' ini membantu pelajar memahami proses mereka dan menghasilkan yang terlibat di dalam projek ini.

ABSTRACT

In this project, the main objective is to let the student make their own project based on their own idea. The study based on the manufacturing process is important to the student because it eases the student to fabricate their project. This project is about designing and fabricating the paper shredder. This project involves the designing process by analyzing the in-market product design. Furthermore, it can help the student on their study. After the specific design is generated, the real product can be fabricated based on the design that has been made as the guide. The main process in this project is joining using rivet and blind rivet. After the real product is done, the student will understand more about the process of designing and fabricating the product properly.

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CHAPTER 1

INTRODUCTION

1.1 Project Synopsis

1.1.1 General Project Synopsis

Final year project is one of the subjects for this semester. In this subject, a project needs to do to fulfil the subject requirement. This project involves designing and fabricating of A4 Manual Paper Shredder. This paper shredder would be entirely different from other existing paper shredder. As the Diploma final year project allocates the duration of 1 semester, this large man-hour project therefore requires significant efforts of the students to participate. Basically the entire A4 Manual Paper Shredder could be divided into 3 stages, which are concept review and development, designing and fabrication.

The A4 Manual Paper Shredder is equipped by using all necessary items and method such as aluminium sheet metal, rivet, skills in manufacturing process by perform turret punching machine and bending machine to cut and bend the parts and etc. The advantages of the proposed paper shredder to be developed can be seen in terms of their application which is design to provide facility to student or university to shred or dispose the confidential document or the unused paper safely.

The process of development is initiated from designing the shape of the paper shredder by considering the function as well. In order to produce user friendly product that is suitable to the consumer, consideration to the ergonomic factor is taken into account. It involves the measurement process before the materials are cut into pieces before assemble together by using cutting and bending processes.

1.1.2 Specific Project Synopsis

Designing and fabrication process for paper shredder is the main term in this project. The paper shredder need to test to check whether it`s mechanism is work or not. This project title is Design and Fabrication of A4 Manual Paper Shredder. The project involves small analysis of the paper shredder cutter and fabrication of the paper shredder itself with concerns regarding strength, portability, durability, ergonomic factor and convenience. This new design is required to improve its durability and features. Test need to be done to verify the strength of the paper shredder cutter before the fabrication process started. It is require more knowledge and skill of analysis. Skill how solve the problem is the most important and need to be improve when this project launched.

1.2 Problem Statement

This paper shredder will primarily can help students and university to shred or dispose the confidential document or unused paper safely. The disposal of paper by the student and university are not effective and it makes the rubbish look big and heavier. This project is to ease the student and university dispose their rubbish especially paper with effectively.

1.3 Project Scope of Work

- 1 Literature Review: Valuable data are searched and gathered. Considering the shape of the paper shredder in terms of its complexity and method to produce.
- 2 Sketching & Designing: Sketching and designing using SolidWorks software in creating the design of the paper shredder.
- 3 Fabrication: Fabricate and produce the paper shredder by using all necessary manufacturing process such as welding, cutting, grinding and etc.
- 4 Testing & Evaluation: Simulate the mechanism of the paper shredder produce is in line with the expected function to be.

1.4 Project Objective

1.4.1 General Objective

Diploma final year project objective is to practice the knowledge and skill of the student that have been gathered before in solving problem using academic research, to born an engineer that have enough knowledge and skill.

This project also important to train and increase the student capability to get know, research, data gathering, analysis making and then solve a problem by research or scientific research. The project also will educate the student in communication like in a presentation and educate them to defend their research in the presentation.

The project also will generate students that have capability to make a good research report in thesis form or technical writing. This project also can produce and

train student to capable of doing work with minimal supervisory and more independent in searching, detailing and expanding the knowledge and experiences.

Nevertheless, this project important to generate and increase interest in research work field.

Our project should be finished until the block diagram was get. This project is apply the lesson and knowledgeable that we learn before. Then, we can practice the skill and solving the problem using academic study. This project also, to create and train a student skill and have an ability to do a work personally. It also gives us, an experience and lesson. How can we solve the problems with several of way and also write a good thesis research.

1.4.2 Specific Project Objective

- 1 To design paper shredder that is suite to its application especially for shred papers.
- 2 To minimize the manufacturing cost by minimize the complexity of the paper shredder and simulate the material used with cheaper material but having high strength and endurance.
- 3 To fabricate and introduce the new concepts and ideas for future prospect of paper shredder.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

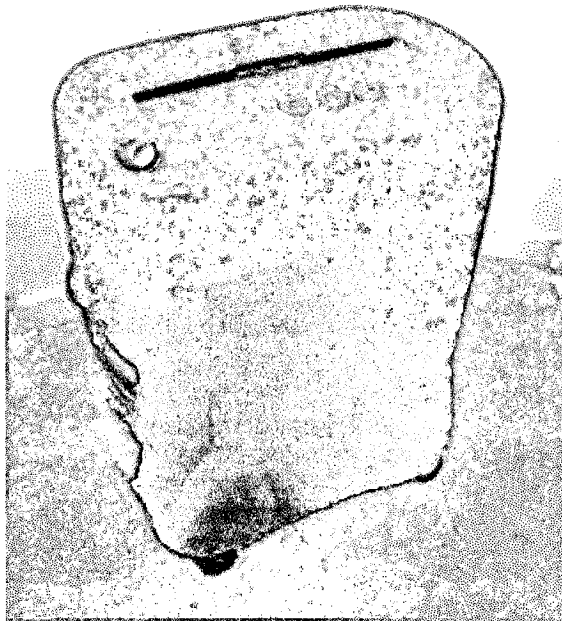


Figure 2.1: Paper shredder with built-in wastebasket

Paper shredders are used to cut paper into very fine strips or tiny paper chips. Government organizations, businesses, and private individuals use shredders to destroy private, confidential, or sensitive documents. Privacy experts often recommend that individuals shred bills, credit card and bank account statements, and other documents that could be used by thieves to commit fraud or identity theft.

The first paper shredder is credited to prolific inventor Abbot Augustus Low of Horseshoe, New York. His patent for a "waste paper receptacle" to offer an improved method of disposing of waste paper was filed on February 2, 1909 and received the U.S. patent number 929,960 on August 31, 1909. Low's invention was never manufactured, however.

Adolf Ehinger's paper shredder, based on a hand-crank pasta maker, was manufactured in 1935 in Germany. Supposedly Adolf needed to shred his anti-Nazi propaganda to avoid the inquiries of the authorities. Ehinger later marketed his shredders to government agencies and financial institutions converting from hand-crank to electric motor. Ehinger's company, EBA Maschinenfabrik, manufactured the first cross-cut paper shredders in 1959 and continues to do so to this day as EBA Krug & Priester GmbH & Co. in Balingen.

The U.S. embassy in Iran used strip-cut paper shredders to reduce paper pages to strips before the embassy was taken over in 1979 (not entirely successfully, see below the section on "unshredding"). After Colonel Oliver North told Congress that he used a Schleicher Intimus 007 S cross-cut model to shred Iran-Contra documents, sales for that company increased nearly 20 percent in 1987.

Until the 1980s, it was rare for paper shredders to be used by non-government entities. After the 1984 Supreme Court decision in *California v. Greenwood*, in which the Supreme Court of the United States held that the Fourth Amendment does not prohibit the warrantless search and seizure of garbage left for collection outside of a home, paper shredders became more popular among US citizens with privacy concerns.

Anti-burning laws, concern over landfills, industrial espionage, and identity theft concerns created greater demand for paper shredding.

Shredding at high levels continues in government agencies too. According to the report of the Paul Volcker Committee, between April and December 2004, Kofi Annan's then Chef de Cabinet Iqbal Riza authorized thousands of UN documents shredded including the entire chronological files of the Oil-for-Food Programme between the years 1997-1999.

2.2 Paper Review

2.2.1 Types of Paper Shredders & Description

Shredders range in size and price from small and inexpensive units meant for a few pages, to large units used by commercial shredding services that costs hundreds of thousands of dollars and can shred millions of documents an hour. Some shredders used by a commercial shredding service are built into a shredding truck.

These machines are classified according to the size and shape of the shreds they produce.

- Strip-cut shredders use rotating knives to cut narrow strips as long as the original sheet of paper. These strips can be reassembled by a determined investigator, so this type of shredder is the least secure. It also creates the highest volume of waste.
- Cross-cut or confetti-cut shredders use two contra-rotating drums to cut rectangular, parallelogram, or diamond-shaped shreds.
- Particle-cut shredders create tiny square or circular pieces.

- Disintegrators and granulators repeatedly cut the paper at random until the particles are small enough to pass through a mesh.
- Hammermills pound the paper through a screen.
- Pierce and Tear Rotating blades pierce the paper and then tear it apart.
- Grinders A rotating shaft with cutting blades grinds the paper until it is small enough to fall through a screen.

There are numerous standards for the security levels of paper shredders, including:

- DIN 32757
 - Level 1 = 12 mm strips
 - Level 2 = 6 mm strips
 - Level 3 = 2 mm strips (Confidential)
 - Level 4 = 2 x 15 mm particles (Commercially Sensitive)
 - Level 5 = 0.8 x 12 mm particles (Top Secret or Classified)
 - Level 6 = 0.8 x 4 mm particles (Top Secret or Classified)
- United States Department of Defense (DoD)
 - Top Secret = 0.8 x 11.1 mm (1/32" x 7/16")
- United States NSA/CSS 02-01 = 1 x 4 mm

Historically, the US General Services Administration (GSA) set paper shredder guidance in the Interim Federal Specification FF-S-001169 dated 7/1971 which was superseded by standard A-A-2599 for classified material which was canceled in 2/2000. GSA has not published a new standard since.

There are also alternative shredders that use burning, chemical decomposition, or composting for disposing of the shreds.

Shredder trucks

A mobile shredding truck is a box truck with an industrial sized paper shredder mounted inside the box, typically in the front section of the box, closest to the cab. The box is divided into two sections: the shredding equipment area, and the payload area for storage of the shredded materials. These trucks have been designed to shred up to 8,000 lbs of paper an hour. Mobile shredding trucks can have a shredded material storage capacity of 6,000 to 15,000 pounds of shredded paper. Office paper is the typical material being shredded, but with increasing security concerns customers also request shredding of CDs, DVDs, hard drives, credit cards, and uniforms, among other things.



Figure 2.2: Paper shredding can be contracted out

2.3 Technical Review

2.3.1 Pictures

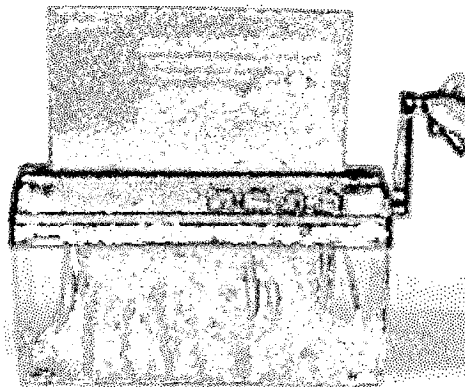


Figure 2.3: A4 hand paper shredder

Product details

- The product is made of plastic and mainly includes 3 parts.
- The main bucket of the shredder is transparent.
- Its size is about 255 x 110 x 110mm. This part is quite light.
- There are four small rubber pads underneath at each of corner, which helps to the bucket slipping from the table when shredding.
- The top part containing the shredder mechanism.
- This part is a bit heavier than the bucket.
- There is a safety cap at a side on a metal bar.
- The third part is a handle, which also has different colors to match the top lid.

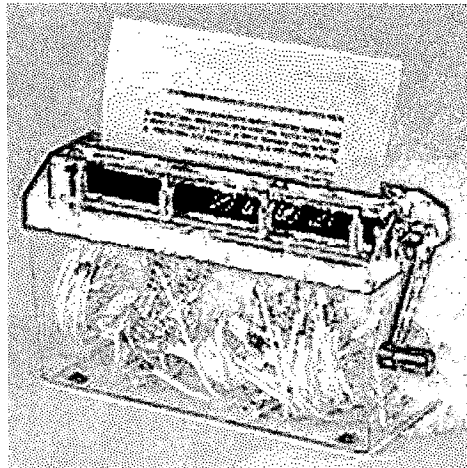


Figure 2.4: Mini paper shredder

Product details

- From stealing credit card numbers to complete identity fraud, failing to keep details confidential can have serious consequences.
- This cool desk-top shredder will take paper up to A4 in size, and shred it into 3mm strips, ensuring total confidentiality of discarded information.
- Ideal for the home and office. The unit is 27cm wide.
- Colors may vary to that pictured.

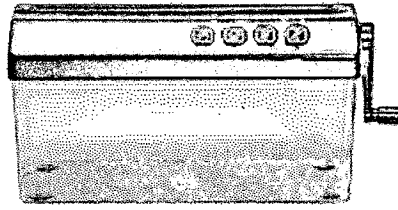


Figure 2.5: Manual paper shredder

Product details

- Ideal for home or office, this desktop paper shredder is perfect for guarding your privacy.
- Destroy credit card statements and offers, personal documents and other paper and mail up to 8 1/2" x 11" with a quick turn of the handle.
- No batteries or power lead needed to further clutter your desk.

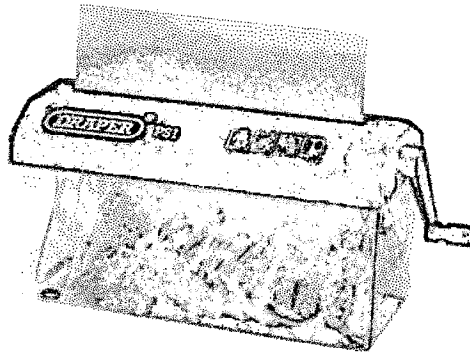


Figure 2.6: Draper 69260 hand operated paper shredder

Product details

- **Boxed-product Weight:** 799 g
- **Item model number:** PS1
- **ASIN:** B0002GV1M8
- **Ideal for use in the home, office or educational establishments.**
- **Shreds paper into 3mm wide strips. Paper width inlet 229mm.**

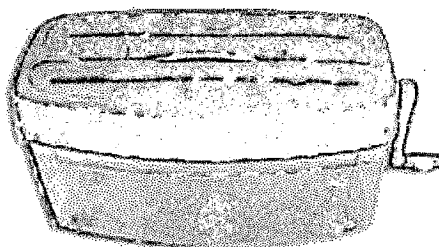


Figure 2.5: Multifunction manual paper shredder.

Product details

- Hand operated
- Includes collection bin
- Steel cutting blades
- Non slip feet
- Shreds A4 sized paper
- Boxed-product Weight: 799 g
- ASIN: B000O9M3RK
- Hand operated paper shredder for office and personal documents.
- Prevent identity fraud by shredding account and personal documents.