DESIGN AND FABRICATION OF AUTOMATIC PAPER CUTTING MACHINE USING GENEVA MECHANISM

A PROJECT REPORT

Submitted by

SAMIDURAI V
(8115U23ME037)

partial fulfilment for the award of the degree
of

BACHELOR OF ENGINEERING

IN

MECHANICAL ENGINEERING

K. RAMAKRISHNAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
SAMAYAPURAM, TRICHY

ANNA UNIVERSITY
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MEB1204 UG PROJECT WORK

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Under the Guidance of

Dr.R.NAVEENKUMAR M.E,Ph.D

Department of Mechanical Engineering

K. RAMAKRISHNAN COLLEGE OF ENGINEERING

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BONAFIDE CERTIFICATE

Certified that this project report titled "**DESIGN AND FABRICATION AUTOMATIC PAPER CUTTING MACHINE USING GENEVA MECHANISM**"is the bonafide work of **SAMIDURAI V,(8115U23ME037)** who carried out the work under my supervision.

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NAME

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Under

ANNA UNIVERSITY, CHENNAI

DECLARATION BY THE CANDITATE

I declare that to the best of my knowledge the work reported here in has been composed solely by myself and that it has not been in whole or in part in any previous application for a degree.

Submitted for the project Viva- Voce held at K. Ramakrishnan College of Engineering on ___________

SIGNATURE OF THE CANDITATE

ACKNOWLEDGMENT

We thank the almighty god without his blessing it would not have been possible for us to complete this project.

At this moment of having successfully completed our project, we wish to convey our sincere thanks and gratitude to our management of our college and our beloved chairman **Dr. K. RAMAKRISHNAN, B.E., Ph.D.,** who provide all the facilities to us.

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ABSTRACT

The Automatic Paper Cutting Machine using the Geneva Mechanism is an innovative solution designed to automate the process of cutting paper with high precision and efficiency. The Geneva mechanism, known for its ability to convert continuous rotary motion into intermittent motion, serves as the core component of this system. The paper cutting machine utilizes this mechanism to drive a cutting blade in a step-by-step motion, ensuring accurate cuts while minimizing material wastage. The machine is programmed to operate with minimal human intervention, offering increased productivity and consistency in large-scale paper cutting applications. This system is ideal for industries such as printing, packaging, and manufacturing, where high throughput and accuracy are essential. The integration of the Geneva mechanism provides a simple yet effective way to automate the cutting process, reducing labor costs and increasing operational efficiency. The design is both cost-effective and scalable, making it suitable for various production scales.

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Key Words: Geneva Mechanism,Automatic Paper Cutting,Intermittent Motion

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CHAPTER 1
INTRODUCTION

The development of automation technologies has transformed various industries, leading to increased efficiency, precision, and productivity. Inparticular, the paper processing and manufacturing sectors have greatly benefited from innovations in automated machinery. Paper cutting, a fundamental operation in industries such as printing, packaging, and stationery, traditionally relied on manual labor, which was often time-consuming, inconsistent, and prone to error. However, the growing demand for faster production, higher precision, and reducedlabor costs has led to the development of automatic paper cutting machines. These machines have revolutionized the way paper is processed, offering improved speed, accuracy, and reliability in cutting operations.

One such advancement is the use of the Geneva mechanism in an automatic paper cutting machine. The Geneva mechanism is a mechanical device that produces an intermittent rotary motion, which makes it ideal for applications that require periodic movement, such as paper cutting. It works by driving a wheel with a pin that fits into slots on a driven wheel, allowing the driven wheel to rotate in fixed increments. This mechanism, which is simple in design yet highly effective, ensures smooth and controlled motion, essential for making accurate and precise cuts in paper.

The integration of the Geneva mechanism in an automatic paper cutting machine enhances the precision and automation of the cutting process. The machine works by feeding paper into the cutting area, where the Geneva mechanism controls the periodic motion of the cutting blade. The blade stops at predetermined intervals to make a precise cut, and then resets to begin the next cycle. This system minimizes the chances of error, ensures consistent cuts, and reduces the need for manual intervention. As a result, automatic paper cutting machines with the Geneva mechanism have become invaluable tools in high-volume production environments, such as printing presses and packaging facilities, where speed and accuracy are paramount

In addition to increasing the efficiency of paper cutting, the use of the Geneva mechanism also offers significant advantages in terms of simplicity and cost-effectiveness. The mechanism's design is relatively straightforward, requiring fewer parts than other types of motion-control systems. This not only reduces the cost of manufacturing but also makes the system more durable and easier tomaintain. The intermittent motion provided by the Geneva mechanism ensures that the cutting blade stops at precise intervals, preventing any misalignment or overlapthat could compromise the quality of the cut.

the automatic paper cutting machine using the Geneva mechanism represents a significant advancement in the field of paper processing. By automating the cutting process and ensuring high precision with minimal human intervention, this system has greatly enhanced the efficiency and effectiveness of paper cutting operations across various industries. As the demand for faster, more reliable, and more cost-effective paper processing solutions continues to grow, the role of automated machines powered by innovative mechanisms like the Geneva mechanism will become increasingly important in shaping the future of paper manufacturing and processing..

The primary benefit of the Geneva mechanism in this application lies in its ability to control the cutting blade's motion with extreme accuracy. By halting the blade at fixed intervals, it guarantees that each cut is clean, precise, and uniform, thereby maintaining the quality of the paper product. Additionally, the periodic stopping mechanism helps to ensure that the blade does not continuously rotate, which could cause misalignment or wear and tear on the cutting mechanism. This leads to lower maintenance costs andlonger machine life, contributing to the overall efficiency and cost-effectiveness of the system.

As the demand for faster, more accurate, and cost-effective paper processing solutions continues to grow, the role of automated machines equipped with the Geneva mechanism is expected to become even more significant. In addition to improving the efficiency and precision of paper cutting operations, future innovations could involve the integration of advanced control systems and sensors to further optimize the machine's performance. For example, incorporating sensors could enable the machine to detect variations in paper thickness, ensuring that the cutting blade applies the correct amount of pressure for different types of paper. Additionally, incorporating artificial intelligence (AI) couldallow the machine to learn from previous cutting patterns, improving its accuracy and efficiency over time

CHAPTER 2

LITERATURE REVIEW

In recent years, the need for automation in paper cutting processes has grown significantly. Industries such as printing, packaging, and manufacturing rely heavily on paper cutting machines to streamline production, reduce manual labor, and increase efficiency. The development of the automatic paper cutting machine, which employs innovative mechanical systems such as the Geneva mechanism, has played a key role in advancing the precision and automation of paper cutting operations. This literature review explores the evolution of paper cutting machines, the application of the Geneva mechanism, and the impact of automation on the paper processing industry.

Historically, paper cutting was a manual process, requiring significant humanlabor, which was time-consuming and prone to error. Early mechanical paper cutters, dating back to the 19th century, employed simple lever mechanisms to cut paper sheets. However, as production volumes grew, the limitations of manual and semi-automated cutting systems became apparent. These early devices could not meet the high-speed, high-precision demands of modern industries.

With the advent of electrical and mechanical engineering, the paper cutting machine evolved to incorporate motors, gears, and automation. The introduction ofelectric-powered paper cutters in the mid-20th century provided the first significantleap forward in reducing human labor. These machines, however, still required operators to manage the cutting process. They were largely driven by continuous motion systems, which, while efficient, often lacked the precision needed for high-quality cuts on various types of paper.

The Geneva mechanism was first invented by Jean-Antoine Lépine, a Swiss watchmaker, around the 18th century. Lépine's design was originally developed for watches to create an intermittent motion, which allowed for precise stopping and starting of the hands of the watch at fixed intervals. Although Lépine did not specifically apply it to paper cutting machines, the principle of the Geneva mechanism became widely used in various mechanical applications after its invention.

Following Lépine's invention, the Geneva mechanism found use in many mechanical systems, including in film projectors, clock drives, and other machinery where intermittent motion was required. During the Industrial Revolution and the development of automated systems in the early 20th century, engineers began exploring the application of Geneva drives in various manufacturing machines. However, early developments in automatic paper cutting machines did not specifically mention the use of the Geneva mechanism until morerecent research on automation in the 21st century.

A significant contribution to the integration of the Geneva mechanism into automatic paper cutting machines was made by M. M. El-Gohary, A. A. Ali, and A. M. Farag in their research in 2004. Their study explored the design and practical application of the Geneva mechanism in paper cutting systems, emphasizing its ability to automate the process with greater precision and efficiency compared to continuous-motion systems. Their work demonstrated how intermittent motion systems, like the Geneva mechanism, could optimize paper cutting machines by reducing mechanical wear and increasing the consistency of cuts.

In 2016, H. K. Bhowmick and colleagues researched automation techniques in paper cutting, focusing on precision, speed, and versatility in machines. Their work contributed to understanding how the Geneva mechanism could be combined with sensors and advanced control systems to enhance the adaptability and accuracy of paper cutting machines. Bhowmick's research recognized the limitations of traditional continuous-motion cutting systems and suggested that periodic or intermittent motion, such as that provided by the Geneva mechanism, could be more efficient for various paper types and thicknesses.

CHAPTER 3

PROBLEM IDENTIFICATION

limited adaptability to different types of paper: One of the major challenges faced by automatic paper cutting machines using the Geneva mechanism is their limited adaptability to different types of paper. Paper comes in various thicknesses, textures, and qualities, and the cutting system must be capable of handling all of these variations without compromising precision.

Wear and Tear on Mechanism Components: The **Geneva mechanism** relies on the movement of pins and slots to convert continuous motion into intermittent motion. Over time, these components may experience **wear and tear** due to repeated engagement and disengagement.

Limited Speed and Throughput: While the Geneva mechanism is known for its precision, it is not particularly well-suited for high-speed operations. The mechanism's intermittent movement can create a bottleneck when cutting a large number of sheets at high speeds.

Paper Alignment and Feeding Issues : For the automatic paper cutting machine to work efficiently, the paper must be fed into the machine in a uniform and aligned manner. However, irregularities in the paper feeding process.

High Initial Setup and Integration Costs: Setting up an automatic paper cutting machine using the Geneva mechanism requires a significant upfront investment

Energy Efficiency and Operational Costs: Although the Geneva mechanism is mechanically efficient, the overall energy consumption of the machine can be a concern, especially when the machine operates for extended periods

Precision with Complex Cutting Patterns: The Geneva mechanism is designed for repetitive motion and fixed, intermittent stops, which is suitable for standard cutting operations. However, for complex cutting patterns, such as those required in custom printing or packaging, the Geneva mechanism may not provide the required flexibility.

Environmental and Safety Concerns: Like many mechanical systems, automatic paper cutting machines face challenges related to environmental and safety concerns.

CHAPTER 4
OBJECTIVES

Increase Cutting Speed and Throughput: One of the primary objectives is to improve the speed and throughput of the paper cutting machine while maintaining precision.

Adaptability to Different Paper Types and Thicknesses: Another crucial objective is to improve the machine's ability to handle a variety of paper types and thicknesses without requiring frequent adjustments.

Optimize energy efficiency: Reducing energy consumption is essential for making the machine more environmentally friendly and cost-effective. Objectives to achieve energy efficiency include Designing energy-efficient motors that requireless power to operate the Geneva mechanism.

Improve Automation and Control: A key objective is to integrate advanced automation and control systems to improve machine operation and reduce human intervention. Objectives include Integrating sensors to monitor paper position, alignment, and thickness in real time, ensuring consistent and accurate cuts.

CHAPTER 5

SELECTION OF MATERILS

5.1 DC MOTOR

DC MOTOR PRINCIPLE:

A DC direct current motor, is an electrical machine that converts direct current (DC) electrical energy into mechanical energy. DC motors use magnetic fields and currents to create torque that causes a rotor to rotate. The speed and torque of a DC motor depend on the motor's design and the electrical input.

WORKING OF AC MOTOR:

A DC motor (Direct Current motor) converts electrical energy into mechanical energy through the interaction of magnetic fields and the current flowing through a conductor. The operation of a DC motor is based on the Lorentz Force Law, which states that when a current-carrying conductor is placed in a magnetic field, it experiences a force, causing it to move. This principle is what drives the rotation of the motor's armature and creates mechanical motion.

In an automatic paper cutting machine, the Geneva mechanism can be employed to convert continuous rotational motion into intermittent motion. A DC motor plays a crucial role in driving this mechanism and the overall machine.

Let’s break down the working of a DC motor in the context of an automatic paper cutting machine using the Geneva mechanism

A DC motor (Direct Current motor) is used to provide the rotational power required to drive various components of the automatic paper cutting machine, including the Geneva mechanism. The motor is selected based on factors like speed, torque, and precision, and it provides the necessary force to move parts that will cut the paper.

The DC motor used in this application typically operates at a consistent speed, but the Geneva mechanism is used to convert the continuous rotation into periodic or intermittent motion that drives the cutting action.

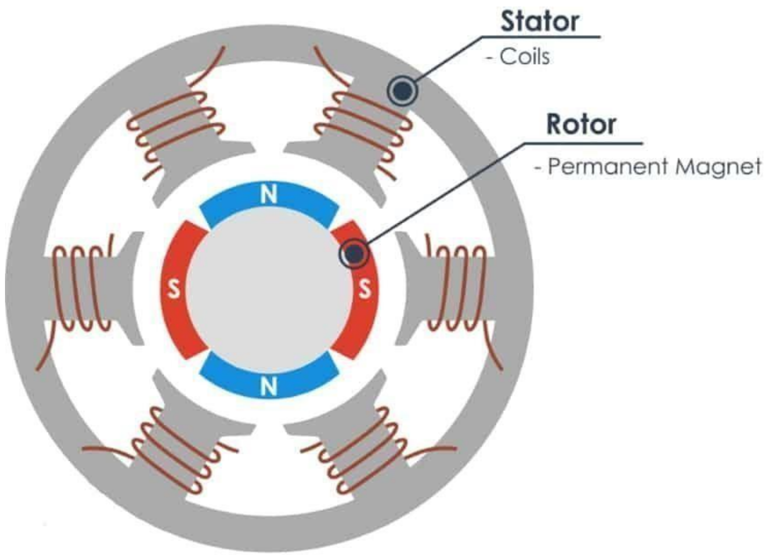

Fig 5.1 DC Motor

5.2 GENEVA WHEEL:

The Geneva wheel, also known as a Geneva drive, is a mechanical device used to convert continuous rotary motion into intermittent rotary motion. It is named after the Geneva mechanism, which was first used inthe Geneva watchmaking industry. The primary function of the Geneva wheel is to produce precise, controlled movements at regular intervals, making it useful in various applications, including clocks, film projectors, and automated machinery like paper cutting machines.

In the case of a paper cutting machine, the Geneva wheel is employed to synchronize the cutting process. The continuous motion from a DC motor or another power source drives the Geneva mechanism, ensuring that the cuttingblades move at precise intervals. This periodic movement allows the blades to make cuts at the correct position on the paper, enabling consistent and accurate cuts every time. The Geneva mechanism is known for its simplicity and reliability, as it consists of only a few key components, making it easy to maintain and cost- effective. Its ability to provide controlled, repeatable movements without requiring complex electronics or sensors makes it an ideal solution for machines that need accurate timing for tasks such as cutting, positioning, or labeling.

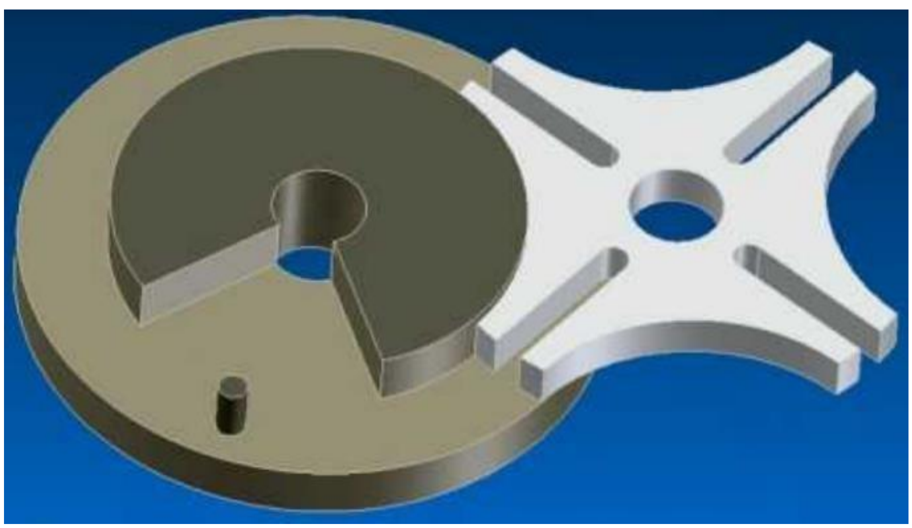

Fig 5.2 Geneva wheel

5.3 DRIVE WHEEL:

A drive wheel in an automatic paper cutting machine plays a crucial role in driving the entire mechanism, which is responsible for precise and controlled cutting. When paired with a Geneva mechanism, the drive wheel operates with high efficiency to translate continuous rotational motion into discrete, intermittent movements that are essential for cutting paper accurately.

The drive wheel in an automatic paper cutting machine typically receives input power from a motor. This power is then transmitted through a series of gears and shafts to the Geneva drive mechanism. The drive wheel is designed to rotate continuously, but the Geneva mechanism—composed of a drive wheel, pin, and Geneva wheel—intermittently locks and releases the motion, allowing the cutter to take precise steps at predetermined intervals.

The Geneva mechanism ensures that the cutting operation occurs only when required. The drive wheel rotates continuously, but as it engages with the pin on the Geneva wheel, it advances the wheel a set number of degrees (usually 90, 180, or 360 degrees) before locking again. This results in a series of "stops" that synchronize with the cutting cycle. This mechanism ensures that the paper is cut at specific intervals, which is vital for consistency in paper sizes and cuts.

In an automatic paper cutting machine, the drive wheel paired with a Geneva mechanism ensures smooth, accurate, and high-speed operation. The continuous motion of the drive wheel, combined with the intermittent locking action of the Geneva mechanism, provides the ideal combination of efficiency and precision required for high-quality paper cutting operations. The design is highly effective in ensuring repeatable, accurate cuts, contributing to the overall performance and longevity of the machine.

Definition of drive wheel: A drive with a Geneva mechanism, is a component that continuously rotates to transmit power to the cutting system. The drive wheel engages with the Geneva mechanism, which converts the continuous motion into intermittent, precise movements. This results in the paper being cut at specific intervals. The Geneva mechanism consists of a drive wheel, a pin, and a Geneva wheel, which together allow the cutting blades to operate only when the paper is positioned correctly, ensuring accuracy and efficiency in the cuttingprocess.wheel in an automatic paper cutting machine, when combined

Functions of drive wheel:

The drive wheel in an automatic paper cutting machine using a Geneva mechanism serves several crucial functions. Primarily, it transmits continuous rotational power from the motor to the cutting system, driving the entire mechanism. The drive wheel works in tandem with the Geneva mechanismto convert this continuous rotation into intermittent, controlled motion. This ensures that the cutting blades are activated only at precise intervals, allowing the paper to be cut accurately and consistently. The intermittent nature of the Geneva mechanism also reduces wear on the components by minimizing constant movement, contributing to the machine's longevity. Additionally, the drive wheel helps synchronize the movement of the paper, ensuring that each sheet is positioned correctly for a clean, accurate cut. By maintaining high operational speed while ensuring precision, the drive wheel with the Geneva mechanism allows the paper cutting machine to perform efficiently in high-volume production environments.

5.4 MILD STEEL: Mild steel, also known as plain-carbon steel, is the most common form of steel because its price is relatively low while it provides material properties that are acceptable for many applications, more so than iron. Low- carbon steel contains approximately 0.05–0.320% carbon making it malleable and ductile. Mild steel has a relatively low tensile strength, but it is cheap and malleable; surface hardness can be increased through carburizing. It is often used when large quantities of steel are needed, for example as structural steel. The density of mild steel is approximately 7.85 g/cm3 (7850 kg/m3 or 0.284 lb/in3) andthe Young's modulus is 210 GPa (30,000,000 psi).

Low-carbon steels suffer from yield-point run out where the material has two yield points. The first yield point (or upper yield point) is higher than the second and the yield drops dramatically after the upper yield point. If a low-carbonsteel is only stressed to some point between the upper and lower yield point then the surface may develop Lüder bands. Low-carbon steels contain less carbon than other steels and are easier to cold-form, making them easier to handle. Mild steel isone of the most commonly used construction materials. It is very strong and can bemade from readily available natural materials. It is known as mild steel because of its relatively low carbon content.

Mild steel usually contains 40 points of carbon at most. One carbon point is .01 percent of carbon in the steel. This means that it has at most .4 percent carbon. Most steels have other alloying elements other than carbon to give them certain desirable mechanical properties. 1018 steel, a common type of mild steel, contains approximately .6 percent to .9 percent manganese, up to .04 percent phosphorus, and up to .05 percent sulphur. Varying these chemicals affects properties such as corrosion resistance and strength. Mild steel is very strong due to the low amount of carbon it contains. In materials science, strength is a complicated term. Mild steel has a high resistance to breakage.

Mild steel, as opposed to higher carbon steels, is quite malleable, even when cold. This means it has high tensile and impact strength. Higher carbon steels usually shatter or crack under stress, while mild steel bends or deforms. Mild steel is especially desirable for construction due to its weldability and machinability.

Fig 5.3

5.5 CUTTING BLADES:

In an automatic paper cutting machine, cutting blades are essential components responsible for performing the actual cutting operation. These blades are typically made of high-quality, durable materials such as hardened steel, ensuring they can withstand the wear and tear of cutting through paper at high speeds. The cutting blades are precisely positioned within the machine to ensure that they make clean, accurate cuts at the desired location.

The operation of the cutting blades is carefully synchronized with the movement of the paper, usually achieved through a combination of the drive wheel and Geneva mechanism. As the drive wheel rotates, it activates the Geneva mechanism, which causes the cutting blades to move intermittently. This controlled motion ensures that the blades only engage when the paper is in the correct position, avoiding mistakes and ensuring precise cuts.

Fig 5.4 cutting blades

5.6 PAPER ROLLER:

The paper roller in an automatic paper cutting machine is a critical component that ensures the efficient and precise feeding of paper into the cutting area. The roller typically consists of one or more rubberized or textured rollers that grip the paper, allowing it to move smoothly and consistently through the machine. The paper roller plays a vital role in maintaining the flow of paper, preventing jams, and ensuring that each sheet is positioned correctly for cutting. As the paper is fed into the machine, the roller applies the necessary pressure to guide the paper forward, moving it into alignment with the cutting blades. This positioning is key to achieving accurate, straight cuts across the entire sheet.

The paper roller system is often designed to accommodate different paper sizes and weights, with adjustable mechanisms that allow for smooth operation regardless of the paper type. Additionally, the rollers are often paired with sensors that detect the paper’s movement, ensuring that it is advancing at the correct pace for synchronized cutting.

In summary, the paper roller is an essential part of the automatic paper cutting machine, ensuring that paper is fed smoothly, aligned correctly, and tensioned

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Fig 5.5 paper roller

CHAPTER 6

DESIGN AND FABRICATION

2D MODEL

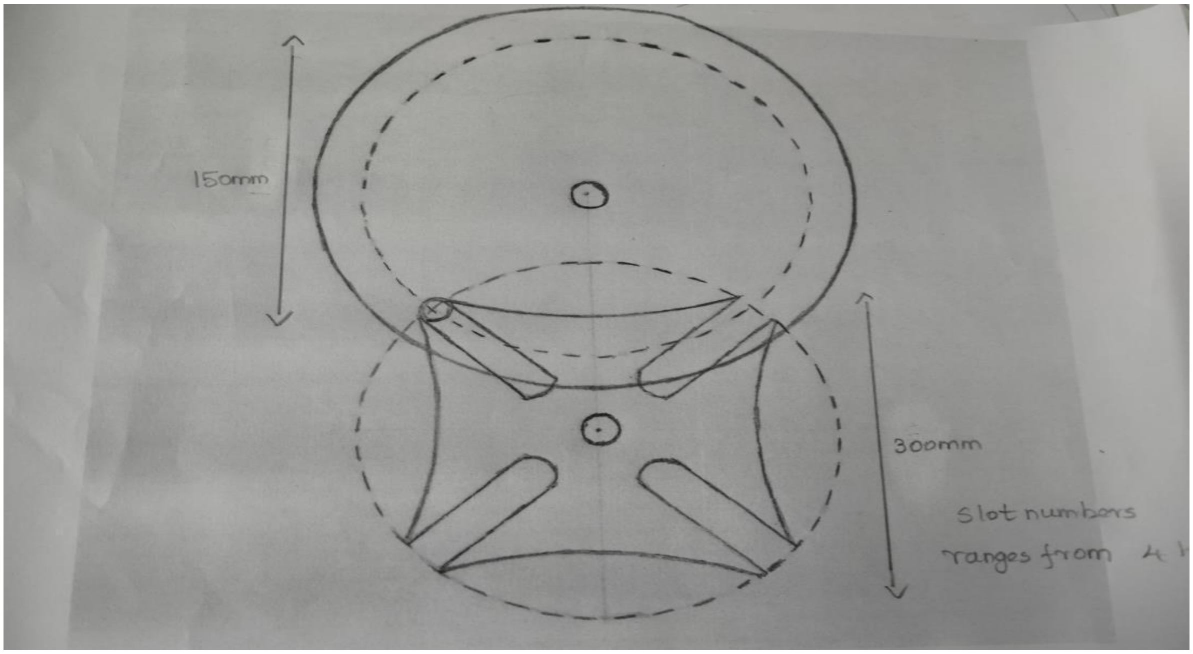

FIG 6.1 Geneva wheel and drive

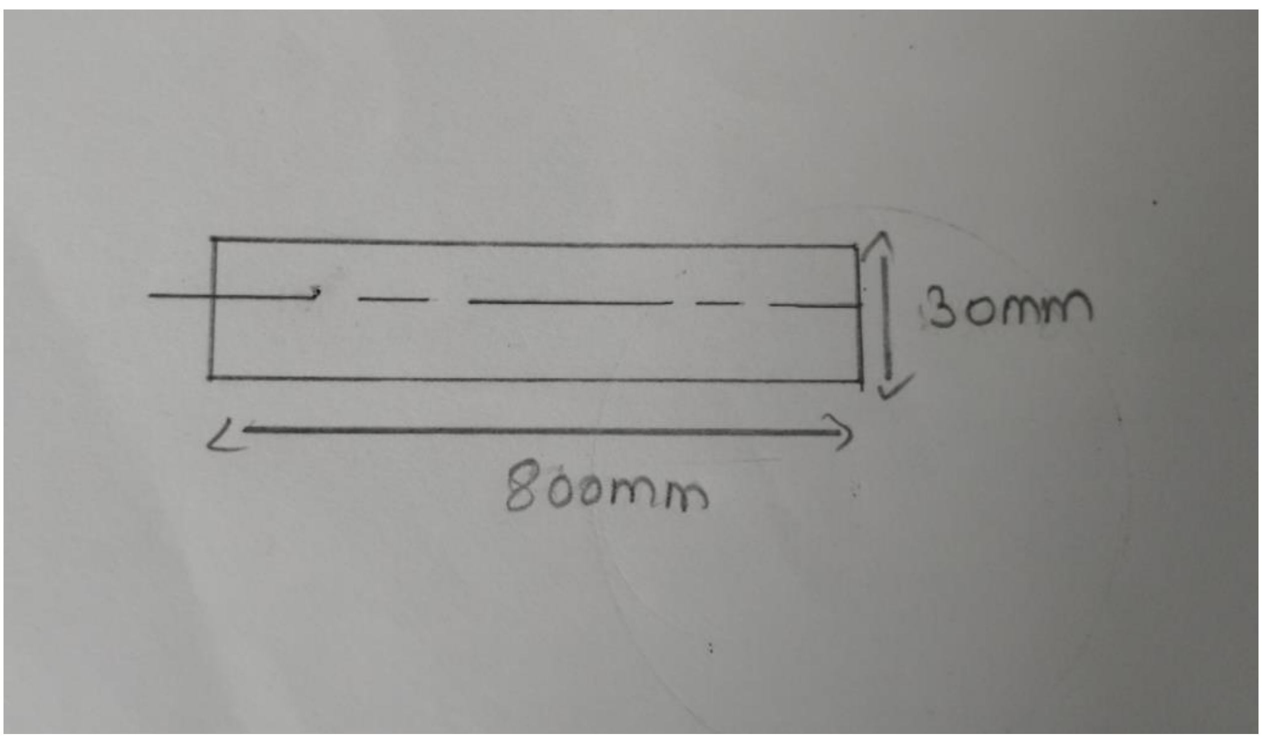

FIG 6.2 Shaft

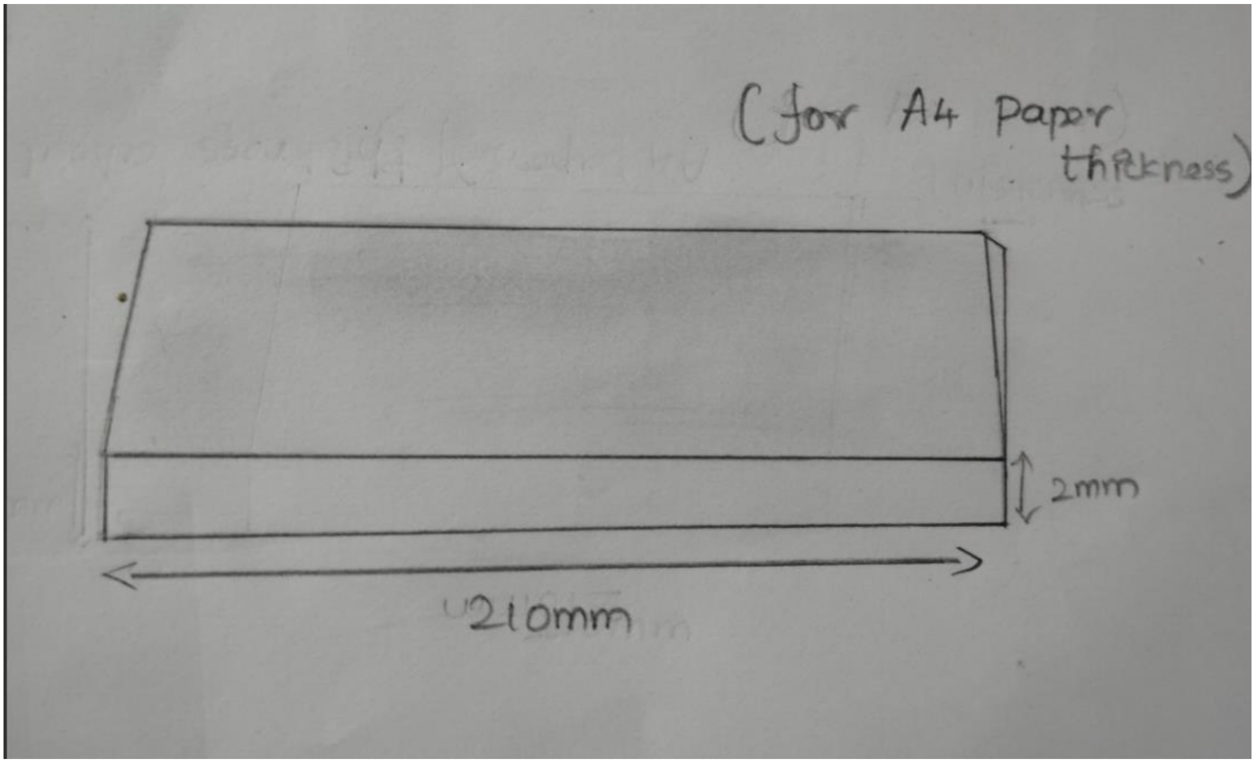

FIG 6.3 Cutting blade

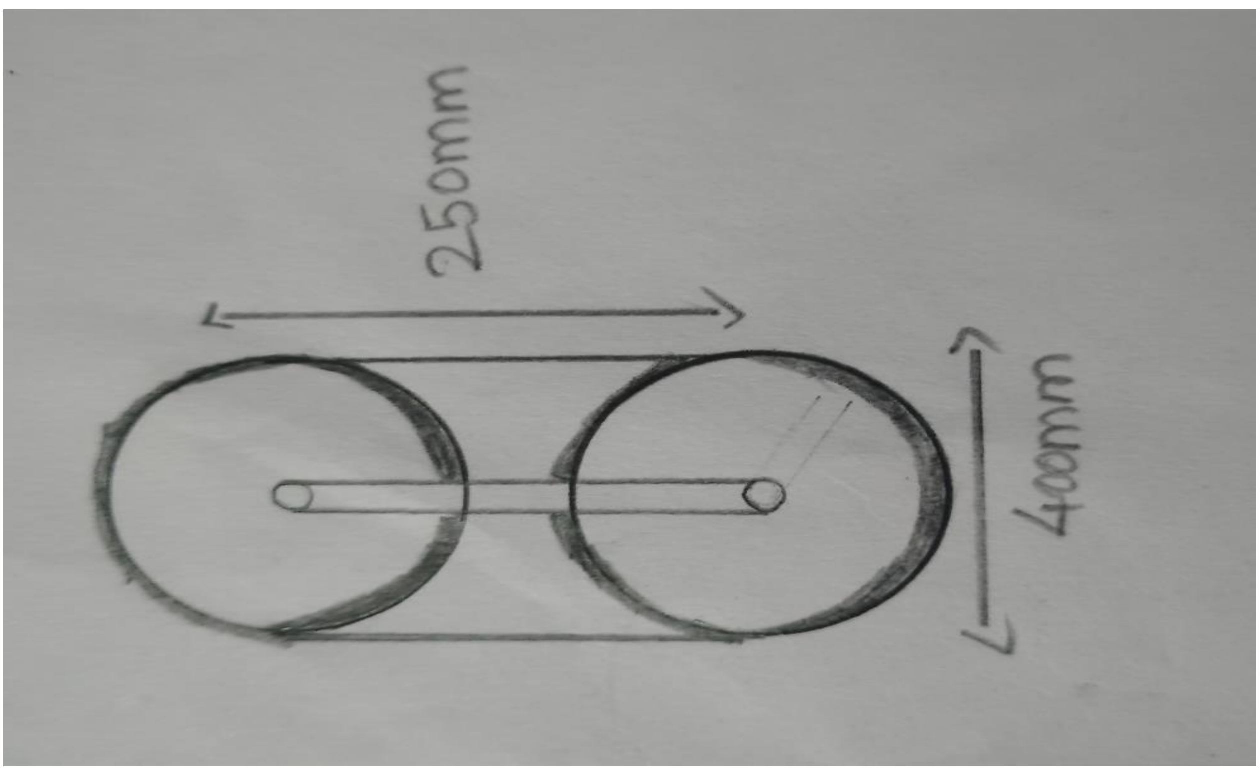

FIG 6.4 Paper roller

3D MODEL

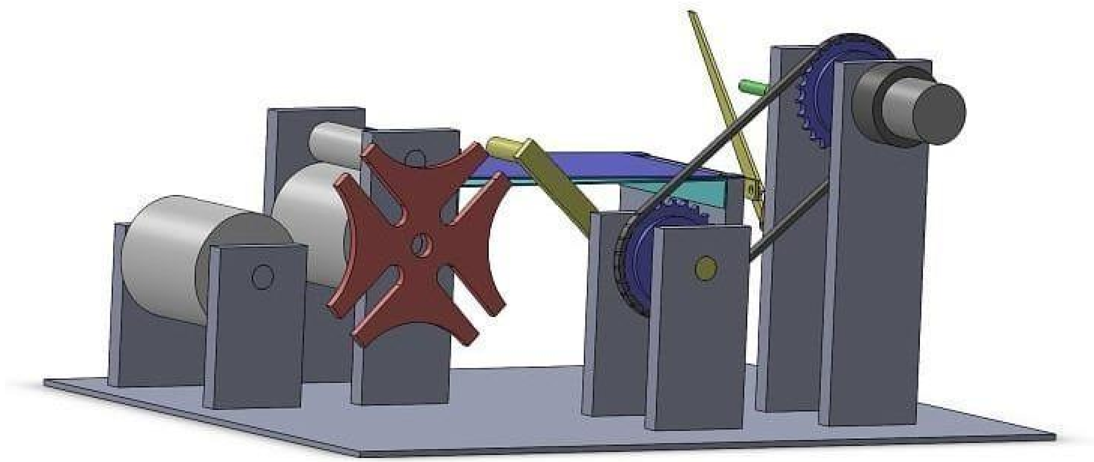

Fig 6.5

FABRICATED MODEL

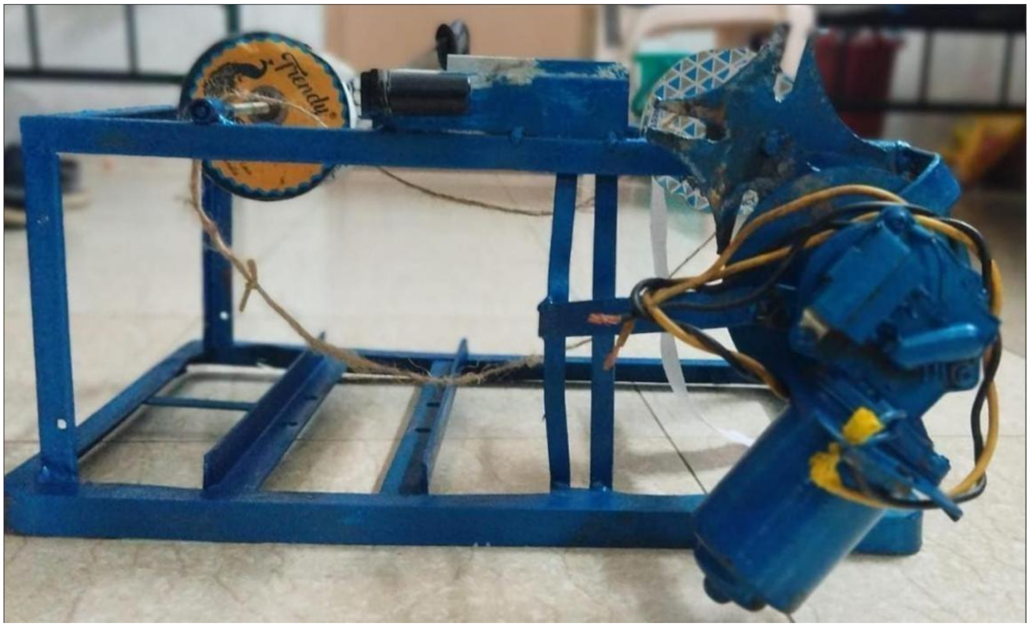

FIG 6.6 Front view

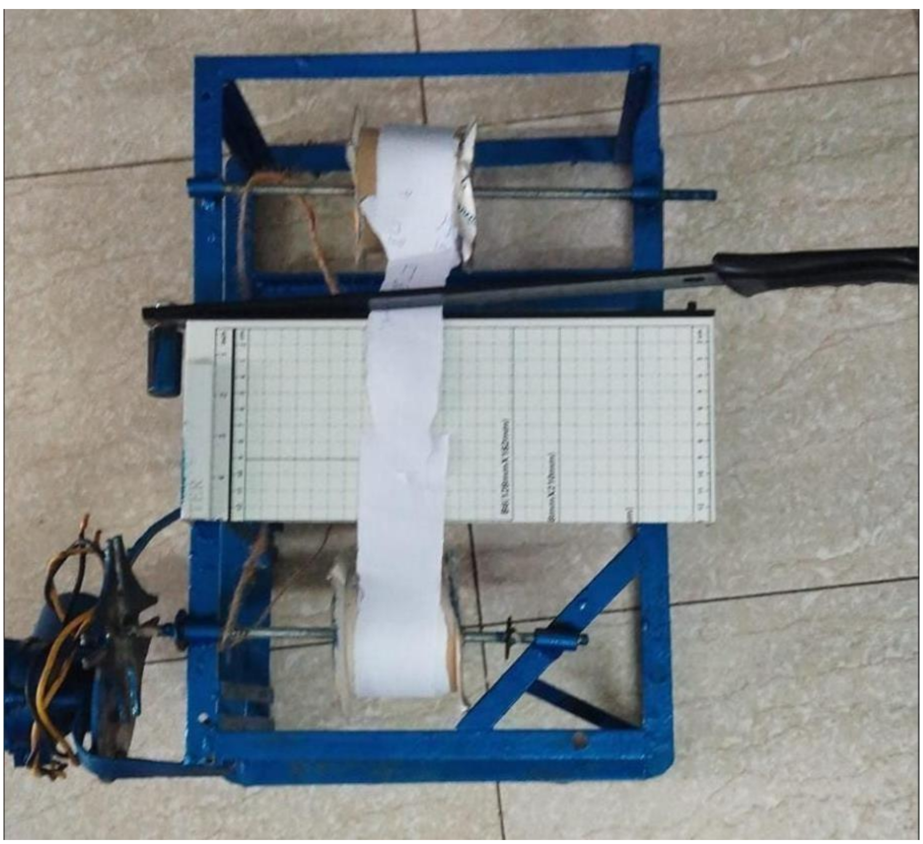

FIG 6.7 Top view

CHAPTER 7

DESIGN AND CALCULATION

GIVEN DATA:

D=4600mm

N=1440rpm

I=3

C=3000mm

STEP:1 SPEED RATIO

I=D\d

d=D\I=1440\3

d=480

STEP-2: DESIGN POWER

design power=(RATED POWER(kw)*ks)\

(ARC OF CONTACT*kd)

ARC OF CONTACT =180-(D-d)\C)*60

180-(4600-480)\(3000)

=1078.62

=179

STEP:3 SELECTION OF BELT

FROM D.B.PG.NO.7.54

FOR DUTT BELT IN SETTING=0.0287KW\mm\ply

Step:4 LOAD RATING AT V M\S=LAD RATING AT V M\S*V\10

V=D1*N1*#\60=#*4600*1440\60= 346.83\60=5078M\S

STEP:5 BELT WIDTH

=DESIGN POWER\LOAD RATING

*NO.OF.PLY(NO.OF.PLY.D.B.PG.NO:7.52)

35.57\0.016*8=276.32

STD.WIDTH VALUE=300mm(D.B.PG.NO:7.52)

STEP:6PULLY WIDTH

(300+25)=325(D.B.PG.NO:7.52)

STEP:7 LENGTH OF BELT

L=2C+#\2(D+d)+(D-d\4C) 2

2*3000+#\2(4600+480)+(4600-480)\(4*3000)

=6000+#\2(5080)+0.1178

= 6000+79.79+0.1176

L=4787mm

GIVEN DATA:

D=2600mm

N=1440rpm

I=3

C=3000mm

STEP:1 SPEED RATIO

I=D\d

d=D\I=2600\3

d=867

STEP:2 DESIGN POWER

design power=(RATED POWER(kw)*ks)\

(ARC OF CONTACT*kd)

arc of contact =180-(D-d)\C)*60

180-(2600-867)\(3000)*60

=180-0.577

=179.42

Kw=20

,KS=1.5,(pg.n.7.53)

=170-180

=1.08-1.04

Kd=0.8=(20*1.5)\(1.06*0.8)

So(ARC OF CONTACT)=1.06,

STEP:3 SELECTION OF BELT

FROM D.B.PG.NO.7.54

FOR DUTT BELT IN SETTING=0.0287KW\mm\ply

Step:4 LOAD RATING AT V M\S=LAD RATING AT V M\S*V\10

V=D1*N1*#\60=(#*2600*1440\60)= (196.030\(60)=3.26M\S

=0.0289*3.26\10=0.0289*0.326

=0.0104kw\mm\ply

STEP:5 BELT WIDTH

=DESIGNPOWER\LOADRATING*NO.OF.PLY(NO.OF.PLY.D.BPG.NO:7.52)

35.57\0.0104*8=425.120

STD.WIDTH VALUE=450(D.B.PG.NO:7.52)

STEP:6 PULLY WIDTH

(450+15)=465(D.B.PG.NO:7.52)

STEP:7 LENGTH OF BELT

L=2C+#\2(D+d)+(D-d\4C) 2

2*3000+#\2(3467)+0.144

=6000+5445.9+0.144

L=1144mm

CHAPTER 8

COST ESTIMATION

SL NO	PARTICLES	AMOUNT
1	MATERIAL COST	2800
2	WELDING	650
3	MACHINING	300
4	DOCUMENTATION	250
5	EXTRA CHARGES	500
6	TOTAL COST	4500

CHAPTER 9

WORKING PRINCIPLES

The working principle of an automatic paper cutting machine using a Geneva mechanism combines continuous rotational motion with precise, step-by-step movements to ensure accurate and clean cuts. The process starts with a motor that drives a continuously rotating drive wheel. This wheel engages the Geneva mechanism, which consists of a drive wheel, Geneva wheel, and a pin. As the drive wheel turns, it intermittently engages the pin on the Geneva wheel, causing it to rotate by a fixed amount, usually 90 degrees, with each engagement. This intermittent rotation is crucial for the precise cutting of paper. As the paper is fed into the machine by rollers, the Geneva mechanism locks the Geneva wheel at specific intervals, allowing the cutting blades to activate only when the paper is correctly positioned. The blades then cut the paper into the desired sizes. The cyclerepeats, with the drive wheel continuing to rotate and the Geneva mechanism ensuring accurate, consistent cutting. This system enables high-speed cutting with precision, making it ideal for large-scale paper cutting operations.

CHAPTER 10
RESULT

The result of using a Geneva mechanism in an automatic paper cutting machine is efficient, precise, and high-speed cutting. By converting continuous rotational motion into intermittent, step-by-step movements, the Geneva mechanism ensures that the cutting blades are activated at the right intervals, allowing for accurate cuts. This system reduces the risk of paper misalignment, minimizes wear on machine components, and ensures consistent performance even in high-volume production. The intermittent nature of the mechanism also leads to smoother operation, preventing paper jams or irregular cuts, which enhances overall machinereliability and longevity. Ultimately, the use of the Geneva mechanism improves the precision, efficiency, and productivity of the paper cutting process.

CHAPTER 11
CONCLUSION

In conclusion, the Geneva mechanism plays a vital role in enhancing the performance and efficiency of an automatic paper cutting machine. By converting the continuous rotational motion from the drive wheel into precise, step-by-step movements, the mechanism ensures that the cutting blades operate at the correct intervals. This allows for highly accurate and uniform cuts, which is essential in high-speed, mass production environments. The intermittent motion provided by the Geneva mechanism prevents overfeeding of paper and reduces the chances of misalignment, which can lead to errors or uneven cuts. Additionally, the simplicity of the Geneva mechanism, with its few moving parts, contributes to the machine's reliability and reduces the need for complex maintenance or frequent repairs. As a result, the automatic paper cutting machine operates smoothly, with minimal wear and tear on components, ensuring long-term durability. Furthermore, the ability to handle high speeds without compromising cutting precision makes the Geneva mechanism a crucial feature for businesses that require fast, consistent, and high-quality paper cutting. Overall, the Geneva mechanism significantly improves the machine’s performance, making it an indispensable component for efficient and precise paper cutting operations.

1. **Precision and Accuracy**: The Geneva mechanism converts continuous motion into controlled, step-by-step movements, ensuring the cutting blades engage at precise intervals for accurate and uniform cuts.
2. **High-Speed Cutting**: The mechanism allows for high-speed cutting while maintaining precision, making it ideal for large-scale, mass production environments.

CHAPTER 12
REFERENCES

Books:

- *"Mechanical Engineering Design"* by J.E. Shigley – This textbook provides in-depth explanations of the various mechanisms used in mechanical designs, including the Geneva drive. It will help you understand how the Geneva mechanism works, its applications, and its design principles.
- *"Design of Machinery"* by Robert L. Norton – This book covers the mechanics of various machines and mechanisms, including the Geneva drive, with an emphasis on analysis, design, and practical applications.

Research Articles:

- "Applications of Geneva Mechanism in Automation" – This paper reviews different uses of the Geneva mechanism in various automated systems, including cutters, indexing, and position control in machines.
- "Design and Analysis of Automatic Indexing Systems" – Discusses how the Geneva mechanism can be used in automatic indexing, which is crucial for a paper cutting machine, ensuring that the paper is properly aligned during the cutting process