

Development of Automated Paper Feeding Mechanism and Numbering Embedded System

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Abstract— The large scale industries utilize fully automated system that is very costly and they use various sensors (for e.g. Photo sensors, proximity sensors, etc.) for sequencing of papers but it becomes very difficult to utilize the same systems for small scale industries as its initial cost of setup is too high. So they engage an extra labour for sequencing and numbering arrangement of papers. This extra labour work affects productivity as well as consumes more time for doing job which is possible to eliminate by introducing automation in this conventional job of sequencing and numbering the papers. So the ultimate aim of ‘Automated paper feeding mechanism and numbering embedded system’ is to develop the mechanism that can be cheaply available for small scale industries and helps to increase productivity of SSI by reducing manual labour and time requirement.

Key words: SSI (Small Scale Industries), Automation, Friction Feed Rollers, Cam and Follower, Delay Timer, Microcontrollers

I. INTRODUCTION

In the growing era of SSI, it becomes very essential to utilize technology and automation to increase productivity of an industry. Printing industry is one of the fastest growing industries around the world. With the time, the process of printing kept on changing. Along with industrialization, automation had taken place of manual work force in every field. Large scale industries were capable of adapting these changes but it is difficult for SSI to implement those automation & technologies in working as its initial setup cost is too high. Many of the work in printing industry is done with automated machines but still some of the work in here has to be done manually because of unavailability of such machines, (for e.g. after printing of invoice bill books, the pages are to be sequenced and numbered manually) which increases time requirement & affect production Thus the ultimate aim of ‘Development of Automatic Paper Feeding and Numbering Embedded Mechanism’ is to reduce manual labour and save time by introducing automation to this process in affordable cost. Utilizing this mechanism its becomes easy for SSI to produce output with less time this system can be easily maintained as the work parts can be easily replaced.

The current status of small scale industries does not utilizes the automation for sequencing and numbering because of lack of availability of sources and due to high initial setup cost of machinery. Also sometimes skill factor plays an important role for operating different automated machineries so it becomes necessary to build the system that can be operated easily and conventionally.

II. NEED OF AUTOMATIC PAPER FEEDING AND NUMBERING EMBEDDED MECHANISM

In age of growing competition it becomes very essential to utilize the available materials in best possible ways and as

compare to large scale industries, SSI always lack in availability of materials as well as technology. Need of modern system is always there so as to increase output and also to decrease manual work. Existing condition of work in SSI should be upgraded as it is inconvenient for any labor to work for long time. By making use of following mechanism, human fatigue level can be reduced and work intensity can be enhanced. In present scenario of the SSI, papers are sequentially arranged and numbered manually which is hectic and time consuming.

Thus our aim is to design and develop the mechanism that can reduce manual workload and easily available and utilized so that the cost and skill factor can be overcome easily. The implementation of this mechanism would be more promising for small scale industries in order to increase output of the system more effectively.

III. OBJECTIVES

The main objective of this mechanism is

- To reduce manual work
- Increase in productivity
- Reduce cost
- Reduce overall time

IV. METHODOLOGY

The automatic paper feeding mechanism with numbering embedded system works under the methodology of mechatronics system to provide automation deals with the elimination of manual work.

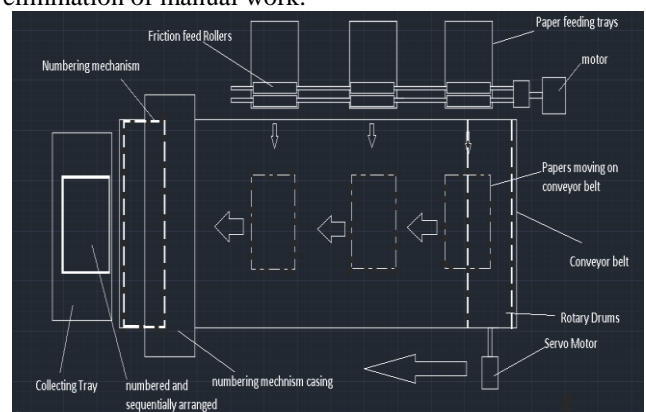


Fig. 1: Schematic Line Diagram Showing Working of Automatic Paper Feeding and Numbering Embedded Mechanism

The papers are arranged in three different trays (set inclined) through which papers are going to fed to the conveyor belt using friction feed rollers in series arrangement along same shaft. The microcontroller is installed for setting delay time in feeding papers to conveyor. It is used to feed single paper at a time from each tray simultaneously. Friction feed rollers are highly effective and are used in printers for paper feed.

Belt conveyors are made to run using servo motor with rotary drums and belt drive arrangement. When the papers are received from roller feeder, they start moving in forward direction on conveyor belt. As paper from tray 3 crosses tray 1, the time delay mechanism (e.g. microcontroller) will give signal to paper feeding roller to release another papers on conveyor belt to prevent overlapping of papers. This mechanism is provided with paper guides for smooth passage of paper over conveyor belt. Also paper guides can be adjusted as per the size of paper so that the papers of different size can be worked on.

Making a pass, paper reaches numbering arrangement where serial numbers are to be printed. In this mechanism, numbers are printed using automatic numbering stamp by cam and follower arrangement with retractable ram. The speed of cam and follower is synchronised with that of conveyor belt so that the number will be printed on at right position without mistake or delay in printing. Then this papers after numbering, continuous their journey to the collecting tray where they are dropped in sequential manner properly. Collecting tray is arranged properly at the end of conveyor belt so that the papers after numbering fall in that properly. This numbering arrangement is provided with adjustable stamping mechanism so that the stamping can be done at a proper place as per requirements.

V. APPLICATION

This type of mechanism finds applications in places such as

- Printing press
- Stationary manufacturers
- Invoice printing press.

VI. FUTURE SCOPE

Although the aim of this paper is to sequentially arrange papers followed by numbering mechanism, it can be utilized with different combinations of mechanism.

Following combination that can be used with sequencing mechanism are:

- Stamping mechanism
- Paper stapling mechanism
- Paper binding mechanism
- Paper cutting mechanism
- Printing

A. Stamping Mechanism

In most of small scale industries stamping is done manually which consumes more and more time as well as labour cost is increased. To overcome this stamping mechanism can also be added in this project design which can reduce time as well as proper stamping in particular format can be obtained. As followed by sequencing mechanism papers are arranged and they can be stamped by using cam and follower mechanism on the collecting tray.

B. Paper Stapling Mechanism

In most of the small scale industries paper stapling is mostly done manually to overcome this stapling mechanism can be used after the sequencing mechanism in which papers are arranged properly and thereafter the arranged papers are stapled properly this will reduce the labour work

C. Paper Binding Mechanism

In most of the small scale industries to bind particular bundle of arranged papers first the papers are arranged manually then binding is to be done to overcome this paper sequencing mechanism can be placed before the binding machine so that the arranged papers can be directly binded which we avoid manual work done.

D. Paper Cutting Mechanism

As followed by sequencing mechanism paper cutting attachment can also be provided in order to cut the paper according to size shape and dimension.

VII. CONCLUSION

The developed automatic paper feeding and numbering embedded mechanism could be beneficial for small scale industries by reducing required time and human effort for job completion with improved efficiency and increase in productivity.

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