

IMPACT OF RECENT TECHNOLOGY IN VARIOUS PARTS OF MODERN SHEET FED OFFSET PRESSES AND ITS IMPACT ON JOB CHANGE OVER TIME

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Abstract

Printing is evolving and new forms of printing are getting added into the printing industry to take care a wide variety of needs and requirements of print buyers/end-users. One of the most popular printing methods, offset printing is preferred by a bigger number of printers worldwide to produce a variety of projects. The plate cylinder, blanket cylinder, and impression cylinder are the three cylinders that are frequently used in the offset printing process. The further subcategories for offset printing are sheet fed offset and web fed offset presses. The term "make-ready" refers to all of the preparations needed to get a printing press ready for printing, such as inking and ink adjustments, dampening solution adjustments, ink and dampening roller adjustments, plate and blanket cylinder adjustments, and other steps taken to avoid wasting time and paper once the job has begun. This study examines in depth the potential effects of technology in contemporary sheet fed offset presses on employment change throughout time.

Keywords: Offset press, sheet-fed offset press, web-fed offset press, make-ready, and offset technology.

Introduction

Offset printing fundamentally employs chemicals to separate the image and non-image components on the image carrier, in contrast to letterpress printing, which physically separates the image and non-image elements from one another. A blanket made of flexible and stretchy rubber is used to transport the inked image from the page to the substrate in this indirect printing technique. The further divisions for offset printing are sheet fed offset and web fed offset presses. The distinction made above is dependent on whether the substrate is fed into the press in cut-sheet or web form. Sheet fed offset presses are characterized by high quality print output and the web fed offset is selected for high-speed press operations.

A typical offset printing press consists of mainly three cylinders and they are arranged in L-shape in sheet fed offset and I-shape in web fed offset presses. All these three cylinders are heavy and made from metals, with emphasis on hard and non-corrosive surfaces. Three cylinders are coupled with gears at each ends, and either spur or helical gears may be used as per the constructional features of the printing press. The plate cylinder is designed to hold the printing plate for printing operation. Blanket cylinder is designed to hold the soft and dimensionally stable rubber blanket around its circumference and impression cylinder is a bare metal cylinder, designed to hold the substrate to be printed. Through a series of inking rollers and dampening rollers, ink along with the fountain solution is applied on to the plate cylinder. Then, through the imprint cylinder, both the ink and fountain solution from the plate surface are transferred on to the blanket and from the blanket onto the substrate (Kareem, 2015).

The inking rollers aid to put a very thin and uniform coating of ink on to the plate that is wound around the plate cylinder in the offset printing procedure. As a result, a series of dampening rollers applies a dampening solution to the plate. In addition to the fountain solution being present on the plate, the ink is transmitted from the plate surface onto the blanket surface. Finally, the blanket's ink and fountain solution are applied to the substrate. The fountain solution that was deposited on the substrate evaporates throughout the drying process, allowing the ink layer to completely set and dry (Bălan, 2021).

Few of the potential benefits and features of lithography-offset printing process can be noted as; resulting very clean & sharper image output, very thin layer of printing inked image on the substrate, uniform layer of ink thickness all over the printing substrate, fine screen print output, consistent and high contrast image output. Most of the technological developments in the machine and process have been successfully developed and absorbed by this printing process along with a wide choice of printing substrate and inks (Smyth, S. 2003).

Technology is always evolving. Even if people have a propensity to freeze technology in place, advancements are still being made gradually. While the early advancements in printing technology were entirely mechanical, many of the more recent advancements are in software systems, such as those that drive workflow or that drive or integrate mechanical systems (such as plate making, presses, bindery, and more) into more connected processes (Marx, 2022).

In modern sheet fed offset presses, the machine is equipped with lots of electronic and micro chips to facilitate functions to make the various functions of different parts of the machine, effectively to increase press accuracy and thereby controlling different operations; ink temperature control, dampening temperature and constituent control, registration and other functions without much delay (Bălan, 2021). Inking and ink adjustments, dampening solution adjustments, ink and dampening roller adjustments, plate and blanket cylinder adjustments, and other procedures done to avoid wasting time and paper once the job itself has started are all included in the term "make-ready," which refers to all of the operations required to set up a printing press for printing. Additionally, colour proofs are printed during the make-ready process, which concludes with the client or customer signing an OK document (Printwiki, 2015).

Printing is evolving and new forms of printing are getting added into the printing industry to take care a wide variety of needs and requirements of print buyers/end-users. Offset printing is one of the most widely used forms of printing and is being preferred by a larger number of printers all over the globe to print different jobs. In the recent times, digital printing is enlarging its base, because of short run print jobs, print-on-demand, customization, versioning and moreover optimum make-ready time, which is certainly making the sheet fed offset printing industry to also look for alternate ways to reduce the job change over time, or more precisely the make ready time on the press. Technology is playing a bigger role and introduction and adoption of technology into different sections of a sheet fed offset press, has made an impact on the possible reduction of make-ready time.

Review of literature

As per, Lehnberg, 2002, in offset printing process, the inked image is not directly transferred from the plate surface on to the substrates, unlike other conventional printing methods. This is basically an indirect method of printing, where in between the plate and the impression part, one intermediate cylinder is incorporated, which is popularly known as impression cylinder. Hence, the inked image from the plate surface is first transferred onto the blanket surface and lastly from the blanket surface it is deposited onto the substrate. Due to the three-cylinder concept, it is very much possible to control highest level of dot formation and accuracy in dot reproduction in this printing process. This is the main reason behind the popularity of offset printing in the printing industry.

As per, Bălan, 2021, continuous improvements in terms of new technological advancements in various sections of the printing press has certainly made it possible to reduce possibly make ready time in a offset press. Most of the press functions are now remotely connected and controlled for achieving better results with least possible time and higher accuracy. As per, Marsh, 2020, Effective job setup and make-ready save machine changeover times and enable you to begin the next print job as fast and effectively as feasible. As a result, productivity rises and the corporation earns more money. The preparation process for the following work doesn't have a defined sequence. Your offside (helper) or designated make-ready technician should be aware of and beginning to consider the next project and what it will require upon start-up while the present job is in progress. The offside prepares for the subsequent work, however while the job is on the press, preparation shouldn't get in the way of the current duty.

As per, Lehnberg, 2002, in recent times, there is a great pressure on the offset press operators to reduce the job change over time or the press make-ready time to the as low as possible. This is mainly due to short run jobs and large number of jobs to be printed in a given set of time. Digital printing, which offers very short make-ready time and the very first copy is a saleable copy, offset press organizations need to reduce the job change over time so that they can printing more number jobs, to compete with the digital printing. Introduction of innovative techniques and technologies in various areas of the offset presses in the recent times have certainly made it possible to bring down the job change over time to a single digit number in minutes, which is a huge achievement.

Research objectives

Traditional and digital printing techniques are the two essential parts of the printing industry. Digital printing techniques are relatively new in the print marketplace in comparison to the conventional/traditional forms of printing. Both the printing techniques have their own sets of advantages, limitations, characteristics, working principles and job suitability. Sheet fed offset printing is one of the widely accepted printing processes, but in recent times it is stiff competition from the digital printing systems; dry toner based digital electro photography, liquid toner based digital electro photography and inkjet presses.

Digital printing presses are well-known for their quick and fast turn-around time, i.e., press make-ready time in these presses is very less. This makes it possible to print small volume jobs, a greater number of jobs can be printed with low print runs in a given time period, comparison

to sheet fed offset presses. Sheet fed offset printing process in the recent times have introduced digital devices in to the machine, for reducing the possible press make-ready time, to compete with the digital printing presses. The objectives of the research work, is to identify and list down various technological developments that have been taken place in sheet fed offset presses, in the recent times and how it helps to reduce the job change over time in these presses.

Research methodology

Two prominent brands in the fields of sheet fed offset manufacturing were identified and the recent technological developments that have been taken place listed down. In the recent times, sheet fed offset press manufacturing segment is facing stiff competition from its digital press counterparts, especially reduction of press make-ready time, as the job run length is decreasing day by day and number of jobs are increasing. Various developments in the technological front on the press part were collected, so that their impact on job changeover time or more specifically press make-ready can be identified and analysed.

German precision mechanical engineering business Heidelberg Druckmaschinen is headquartered in Wiesloch/Walldorf and has registered offices in Heidelberg, Baden-Württemberg. As the largest offset printing press manufacturer in the world, the firm provides goods and services along the whole production and value chain for printed goods. The majority of high-quality, multicolour items like catalogues, calendars, posters, and labels are printed using sheet-fed offset technology. Prepress, press, and post-press equipment are produced by Heidelberg. Thus, the Heidelberg sheet fed offset press was chosen to gather information about significant advancements in press technology over time. For commercial, packaging, and publishing applications, Manroland Sheet-fed GmbH is a top global manufacturer of sheet-fed offset printing machines and related technology.

Data collection & Analysis

Manroland's Simultaneous Plate Loading technology, plate loading and blanket cleaning all takes place simultaneously, resulting in significant cost savings, higher productivity and superior print quality. This technology drastically reduces make-ready times. Plate exchange, blanket cylinder and impression cylinder washing can be done simultaneously in all printing units in less than 4 minutes. Simultaneous blanket washing, impression cylinder washing, printing and coating plate changes, roller washing and inking up done simultaneously reduces make-ready times by up to 60%.

Simultaneous plate loading technology, plate loading and blanket cleaning all takes place simultaneously, resulting in significant cost savings, higher productivity and superior print quality. Automatically starts the individual set-up processes when changing jobs leaving the operator free to focus on other tasks. This results in multiple signature changes or complete job changes without interruption.

The quickest sheet-fed offset press ever is unveiled by Heidelberg. From 18,000 sheets per hour, the Speed master XL 106 can now print 21,000 sheets per hour. From feeder to delivery, Heidelberg has optimised almost 200 parts of the complete system. For instance, to guarantee steady and dependable operation, two servo motors now directly drive the feeder, and during delivery, the weight of the gripper bars has been lowered and they have been adjusted to the increased printing speed. The printing business is evolving due to digitization. Heidelberg is making use across the board of the far-reaching optimization potential of digital technologies in the enhancement of its Speed master series with the objective of smart integration within the print shop and as part of a smart printing industry. High-performance feeder with fully automatic pre-settings for all relevant format and air settings, for extremely short make-ready times and steady sheet travel. It offers fully automatic simultaneous plate change while washing blanket and impression cylinders at the same time for fast make-ready.

Result & Discussion

From the collected data of two very prominent sheet fed offset press manufacturers, it is very much clear that, utmost importance is given towards reduction of job change over time/press make-ready time. In recent years, to take care of low print volume and large number of job varieties, so as to remain in the print market, sheet fed offset manufacturers are eyeing on adoption of technological innovations in various units of the sheet fed offset press, so that many activities, like, loading of printing plates into the plate cylinders, automatic cleaning of blanket, impression cylinder can be performed without much delay. Fully automatic pre-setting of various units, especially feeding unit and delivery unit are some of the areas, where the press manufacturers have gone an extra mile, and the result is highly visible. Some of the press functions are intentionally overlapped to enhance the press functioning, whose end result is seen in the form of make-ready time reduction, during press setting.

Conclusion

Ultimate aim of any sheet fed offset press is to print with desired quality and within the standard press production time. In recent years, after the introduction of digital presses, especially after 1995, sheet fed offset printing segment is facing a new challenge. It is in the form of possible reduction of press make-ready/job change over time, so that a greater number of jobs can be printed effectively within a stipulated time period. Day by day, print run length is reducing and varieties of print jobs are increasing. To address such situations, technology came into picture and it is very clear from the two prominent press manufacturers that, it has played a bigger role, particularly in recent days, and press make-ready time has been able to come down successfully to less than four minutes, which is certainly a very big achievement for the sheet fed offset presses. In coming times, technology will dominate in other areas pertaining to the offset press, for high level of press flexibility and even further reduction of job change over time.

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