

## **Research on the Status Quo and Development of Digital Printing Technology**

*Akbar, Print Application Engineer, Provin Technos, New Delhi*

### **Abstract**

Digital printing technology in China has advanced in tandem with the country's expanding internet infrastructure. Its widespread use in China's printing sector has also led to positive economic and social outcomes. But there are still many issues in the application process of digital printing technology, which calls for relevant technical professionals to bolster research in this field and carry out the necessary reform and optimization of the present digital printing technology. The primary focus of this study is an examination of the current state and future prospects of digital printing.

### **1.Introduction**

Digital printing technology has many advantages over conventional printing methods, including greater efficiency, convenience, energy savings, and environmental friendliness, and the ability to print after the graphic information has been effectively processed by the printing system. This means that printing jobs with a high volume of copies can be completed quickly and efficiently. It's crucial to the growth of China's printing sector and can satisfy the demands of printing in a variety of settings.

### **2. A Brief Analysis of the Characteristics of Digital Printing Technology**

#### **2.1 High Efficiency and Flexibility**

When printing by digital printing technology, it is also possible to remove the intermediary plate-making process and the transmission link of the traditional printing mode, which can support the work efficiency of the printing task to be considerably improved. In the conventional printing method, from the time the print job is received until the finished product is delivered to the customer, several days of work time are required. Good economic and social benefits can be obtained through the use of digital printing technology due to the time saved, the printing efficiency increased, and the elimination of wasteful printing materials [1]. In the process of printing graphic information, the digital printing technology can also alter the graphic information in a timely and effective manner, which makes the printing job flexibility to a certain extent. The printing process has become more versatile thanks to the advancement of digital printing technology, allowing for the printing of distinct information contents on two neighboring printed materials, resulting in a more vibrant printout.

#### **2.2 Fully Digital**

In digital printing, every step of the process is controlled digitally. You are free to share and adapt this work under the provisions of the Creative Commons Attribution 3.0 license. All subsequent copies must include a reference to the original publication along with the authors' names, the date of publication, the name of the journal, and the digital object identifier (DOI). Plates and films for a particular printing technique can be made on a computer, and the necessary graphic and text information can be created and edited. Backplane tool dependence will also be considerably diminished. Digital printing is often described as being "completely dependent on digital and technological information technology." Good graphic printing results can be achieved with just a computer.

### **2.3 Without Time and Space Limits**

By using information technologies like the Internet, digital printing technology is able to overcome the temporal and geographical constraints of conventional printing methods [2]. When only one printing method is used, printing becomes excessively laborious and takes too much time, as is the case with traditional printing. The quantity of printing tasks is high, but the quality is low, and the rate of printing is slow. The difficulty is the speed is too sluggish, and it is impossible to fully fulfill the criteria of printing efficiency, which is also the limitation of time in the traditional printing method. There being a close relationship between each step of the typical printing process, off-site printing is difficult to implement, and there are physical constraints. Using the Internet or a local area network (LAN), digital printing technology not only makes the original information and original process timely, but it also efficiently transmits the graphic information that is produced. The improved printing efficiency and convenience result from a breakthrough in the time and space constraints of the conventional printing mode.

### **2.4 Environmental Protection**

Lekai Huaguang showcased many versions of their thermal CTP (the TP-U type), heat-free thermal CTP (the TP-G type), and low-chemical purple laser CTP (the PPVG type) at drupa 2016. By eliminating the need for chemicals and other materials often used in the CTP process, printing companies can save time and money while simultaneously improving plate quality and reducing their impact on the environment. In addition, the digital printing technique allows for a controlled number of production prints, and the print pattern may be used to guarantee an appropriate print run size, so reducing waste. Digital printing technology has good environmental performance because it allows for precise control over the number of printed pages, cutting down on unnecessary paper and ink usage and protecting the environment from harmful emissions.

## **3. Analysis on the Status Quo of Digital Printing Technology Development in China**

With the ongoing expansion of China's science and technology, digital printing technology has also been widely adopted. However, China's digital printing technology is used late compared to certain developed countries outside, and there are still numerous deficiencies in the specific

application procedure. In order to keep up with the printing business in China as it grows, digital printing technology must be constantly improved and updated.

### **3.1 Development Status of Digital Printing Technology**

When using a computer, you may now print online directly from the computer to the printer, thanks to digital printing technology [3]. China's printing sector has been heavily reliant on computer technology for more than two decades. Even though it was only implemented in the prepress information processing stage, it helped push the digitalization of China's printing sector forward. New printing methods and digital technologies are being implemented across China's printing sector at the moment, which has increased the flexibility and productivity of printing in order to better satisfy market demands.

As printing technology in China has advanced over the past few years, digital printing in the country has expanded beyond its roots in basic graphic printing to include more specialized printing equipment. This process has resulted in a significant expansion of the capabilities of digital printing, as well as the evolution of printing materials from specialized paper to a wide range of packaging options that may effectively overcome the constraints of conventional print production. As an added bonus, it portends well for the growth of China's printing industry in the future. There is now very little of a technological gap between digital printing and packaging printing because to advancements in both fields and the proliferation of other printing technologies like 3D printing.

### **3.2 Development of Digital Printing Equipment**

While there are certainly issues with how digital printing is being implemented in China, there is sufficient technological support for doing so thanks to advances in science and technology. The number and diversity of specialized printing equipment has been substantially improved, and modern digital printing technology can connect color printers effectively. It's safe to say that China's digital printing technology is always getting better and better, and that in a relatively short amount of time, the country has progressed from manual to semi-automatic to fully digital printing. Current digital printing technology allows for one-time imaging without the need for a printing plate, and its modular architecture allows for the diverse combination of printing methods, reducing the number of devices required for printing to just a roller and a roller cover. Printing products with varying designs and technical requirements is made possible by the replacement work. It also offers an easy-to-use mode that may efficiently tackle the manual challenges necessary in traditional printing job.

China's printing materials have been improved and refined to some extent, and the detailed classification of professional printing consumables has been carried out in digital printing technology, so that the printing work is no longer limited. In the past, we adapted several types of paper to our printing demands. As a result, China's printing sector has advanced thanks to the widespread use of digital printing technology in recent years, the consistent modernization of printing machinery and the development of higher quality printing materials.

#### **4. Problems in Digital Printing Technology**

##### **4.1 The Printing Process is Not Fully Environmentally Friendly**

The digital printing technology in China has advanced fast in recent years, allowing for a wider variety of digital printing methods to be used. Some printing processes, especially those that are applied at scale, can be harmful to the environment, however. For instance, gravure printing is highly valued in China's packaging and printing industries. The printing process is printed on a variety of materials. It has been widely utilized in printing across numerous industries due to its high quality requirements and rich technical content. Banknotes and postage stamps are just two examples of the kinds of securities that can benefit from the integration of gravure printing with other unique processes. Gravure printing items have considerable growth potential because of their proximity to consumers and their usefulness in daily life [4]. It is challenging to meet the unique needs of China's essential environmental protection rules due to the printing method's emission of objects that cause substantial pollution to the surrounding environment. In order to boost digital printing's environmental performance, it is essential that the appropriate technical staff identify and address the underlying causes of environmental degradation.

##### **4.2 The Performance of the Printing Industry Lacks Rationality**

Most of China's printing sector is currently reliant on outdated technology to complete printing tasks. Printing quality and efficiency are also problematic, and the digital level isn't high enough to fulfill the demands of societal progress. The printing impact can be greatly enhanced by using state-of-the-art printing machinery, which can also serve as a useful compass for the industry's future growth. However, some printing enterprises in China still have insufficient investment in printing equipment, and there are serious shortages of high-end equipment, which has led to the unreasonable structure of the entire printing industry, which has produced a steady and stable development of China's printing industry. Therefore, in order to achieve good economic and social benefits, the Chinese printing industry needs to replace the conventional low-end equipment used in the printing production of various works.

##### **4.3 Insufficient Application Level of Hybrid Printing Technology**

Hybrid printing technology has the potential to further improve the efficiency and reach of digital printing, making it a promising area of growth for China's printing sector. Some industrialized countries' mixed printing technology has reached a mature stage of development and obtained good application outcomes. However, due to a late start in research and application, imperfect development of some key technologies, and the absence of a fully formed printing industry chain, mixed printing technology is more difficult to promote in China. Additionally, the optimization and development of printing technology has been hampered by China's continuing talent gap in mixed printing technology. This calls for an increase in the number of students being trained as professionals in this subject at relevant

middle and high school vocational institutions. The printing industry will have sufficient manpower to continue functioning.

## **5. Printing Technology Trends**

### **5.1 Automated Development**

With the continuing growth of China's network technology, many modern printing equipments also have certain automatic processing technology, and applied to a variety of automation technologies such as computer automatic control technology and shaftless technology. In the conventional printing method, humidity and temperature in the printing workshop must be well controlled during the printing process to prevent the effects of these environmental elements on the printing quality. Human factors can also play a role in the printing process due to the reliance on manual labor in the traditional printing technique. Automation technology allows for timely analysis of the printing plant's temperature and humidity, allowing for the plant's environment to be kept within an acceptable range using tools like air conditioners and dehumidifiers, guaranteeing the printing products and their quality. In addition, the use of automation technology enables the entire printing process to be carried out in accordance with a predetermined procedure, which can lessen the labor loss in the conventional printing work and, on the flip side, effectively eliminate the influence of human factors on the printing quality of the final product. As a result, the printing firm's economic and social benefits have skyrocketed.

### **5.2 Digital Development**

The 2016 Drupa is the global trade fair for digital printing technology. The exhibition shows that the printing industry is not the only one where digital technology has been put to use. Digital printing has advanced greatly, with software making the production process more intelligent and the connection inspection becoming the std. in the industry. CTP has completely replaced the traditional prepress plate making; the digital printing machine has improved the energy level, whether printing a full rotation or a single sheet of paper. The Internet docking makes printing simpler and quicker, and the order status is transparent to the consumer.

The international authoritative survey organization Smithers Peel's research report "Digital Printing and the Future of Traditional Printing" released in 2016 shows that there has not been a big change in the global printing volume in 2016, and the market share of traditional printing has dropped to 97.3%. By 2020, experts predict the figure will have dropped to 96.5 percent. The share of the worldwide printing market that was contributed by digital printing in 2016 was 9%; by 2020, that share is projected to rise to 17.6%. In addition to its widespread use in labeling and anti-counterfeiting printing, digital printing has proven particularly useful for graphic printing and short-run commercial printing. It has also been embraced by publishers for short-run book printing. Digital printing has begun to advance to printing and dyeing,

towards home decoration, and it is not uncommon to find personalized printing of wallpapers and tiles.

### 5.3 Green Development

As China's printing sector has grown, so has the number of industries that have successfully used digital printing. The domestic digital printing business has also expanded greatly in this form, opening up a broader range of possible uses [5]. In response to rising public concern for the environment, China has enacted a number of measures meant to lessen the country's impact on the planet, and the country has also began actively promoting green printing and environmental printing. Existing digital printing technology will unavoidably advance toward more eco-friendly methods. To get good results in terms of economic advantages and ecological benefits, it must also replace the current antiquated printing structure and raise the market share of the digital printing industry. The growth of green printing businesses in China to around 40% in recent years is encouraging progress toward a more sustainable society.

### 6. Conclusion

Digital printing's ability to tailor output to each customer is a major selling point. The process also lends itself well to on-demand printing, variable printing, and off-site printing, all of which help to cut down on surplus stock and waste. To aid in the printing industry's continued growth in China, businesses in the sector must increase their focus on research into this area, as well as investigate the most efficient route of transformation for "traditional + digital" factories, and build from there to continuously optimize and innovate printing technology modes that achieve "business complementarity" and "Production complementarity."

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