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Flexo printing process step by step

In this article, we'll explore the key element of the flexo printing process. Flexography gives us the versatility to design and print incredible packaging. Flexographic printing, also known as flexo, is a versatile and widely used technique for creating high-quality printed materials. Besides printing, additional stations can varnish, laminate, die-cut, hot foil, perforate, sheet, or coat. Water-based inks are the most commonly used type of flexographic ink. The plates, dies, and colours are mounted on the machine, which is equipped with the appropriate raw material. Flexography is used for packaging because it offers a number of advantages over other printing methods. And it's no wonder why flexo is so popular – it's capable of producing high-quality printing reliably at high speeds. 5. Printing and image transfer As the substrate moves through the press, the inked plates transfer the desired image or text onto it. Today, modern 'Computer-to-Plate' technology (CTP) is used, which means that the image can be created directly from a digital file. The flexo printing plate is mounted on the press. The flexo print process is continuous, meaning that the substrate is reel-fed into the machine, and prints are produced continuously at high-speed. This article aims to comprehensively guide you through the fundamental steps of the flexo printing process in a cohesive manner. Solvent-based inks are another popular option for flexographic printing. Flexography is used for food packaging in particular because it can be used to print non-porous materials like foil, cellophane, and plastic. A fountain cylinder spins in an ink tray and coats the spinning anilox cylinder with a thin coating of ink. Primed with its coating of ink, the spinning anilox cylinder then primes the attached flexo plate with a thin coating of ink. The substrate (material being printed on) is fed through the press, where the impression cylinder presses it firmly against the flexo printing plate. An image is printed one layer at a time, ensuring that they are overlaid without any gaps. It is capable of high-speed, high-volume printing, relatively cheaply. Flexographic printing presses can print at speeds of up to 2000ft per minute. Flexography produces sharp details and bright colours. Flexo printers can be configured to carry out numerous processes in one pass. Flexo printers are commonly used in various publications, as well as for creating art prints and posters. The pressman or machine operator then prepares the machine and colours to match the requirements. Training operators is simpler than for other types of presses. Flexo printing plates are expensive to produce, making frequent plate changes impractical (plates can last for millions of impressions when properly cared for). Flexo printing can be limited by the amount of ink that can be transferred to the substrate. Anilox rollers can become clogged with ink, which can cause smudging or streaking. The quality of flexo printing can vary depending on the skill of the operator and the condition of the flexographic press. Flexo printing is not well suited for very small print runs or for printing on porous substrates such as cloth or tissue paper. Picture the shelves of your local supermarket or convenience store. Flexo printing can be divided into three main stages: pre-press, on-press, and post-press. The printhead moves across the sheet, applying the image to each section as it passes. Attention to detail during the design phase is crucial for producing high-quality flexo prints. Find out more about flexographic printing. For more information on how flexographic printing works and the benefits for your business, please download our free Guide to Flexo Printing or call Focus Label on 0115 824 5426. Flexo printing utilises materials like paper or fabric to create printed products. To control the ink application, anilox rollers are used which have a pattern of tiny cells that carry and deliver a precise amount of ink to the plate surface. Flexo printing is used in packaging, labels, and commercial printing because it's fast, flexible, and works on many materials. While offset printing is at the crux of our service offering, we've been working with print media for 50 years. This process, known as pattern ready, ensures optimal printing quality. Controlled feeding is vital to prevent misalignment and ensure the exceptional quality of the final print. In flexographic printing there are six main stages: 1. Particularly popular in the packaging and label sector due to its efficiency and ability to produce vibrant, detailed prints, flexographic printing delivers consistent and reliable results and is the go-to printing method for many companies in a variety of industries. This allows for quality checks before moving on to the main printing process. In the post-press stage, materials received from the printing department are converted into the required quantity and rolled up. 3. Ink Application: The ink is supplied to the printing press through ink chambers or rubber rollers. If it's too slow, drying may cause excess ink buildup. Print Speed Guidelines: Water-based inks – 80-150 m/min UV inks – 120-200 m/min. Dryer: Dries instantly, great for fast runs. Hot Air Drying: Works for water-based and solvent inks, but takes longer. Fact: Poor drying causes 30% of flexo printing defects, mostly in high-speed jobs. Pro Tip: When running at higher speeds, check the first 10 meters of printed material to spot drying issues early. The Future of Flexo Printing: Flexo printing is evolving with automation, digital integration, and sustainability efforts. Automation: More presses now feature automated registration and real-time quality checks. Eco-Friendly Materials: Low-VOC inks and biodegradable substrates are becoming the industry standard. Digital Flexo Printing: Hybrid solutions combine flexo efficiency with digital customization for greater flexibility. Wrapping Flexo printing is a reliable choice for packaging and labels. UV curable inks are cured using ultraviolet light, rather than being dried by evaporation like water-based inks. If the ink is too thin, colors look faded; if it's too thick, the print can get messy. Ideal Viscosity (Measured with a Zahn Cup): 19-24 seconds for water-based inks. 30-60 seconds for solvent-based inks. Recommended pH Levels for Water-Based Inks: 8.2-9.4 for stable performance. Fact: Keeping pH levels within the correct range reduces print defects by 20% and helps maintain ink flow. Pro Tip: Ink viscosity changes throughout a long print run. It's unique because of the variety of materials it can print on, including cardboard, plastic films, and metallic foil. Preparing the printing plates: The basis for effective flexo printing is the printing plates, which are usually manufactured from soft and resilient rubber or flexible photopolymer. Solvent-based inks have a lower surface-tension and are commonly used to print plastic carrier bags, cellophane, and plastic films. It can print on a wide variety of substrates, including paper, cardboard, plastic film, and metallic foil (importantly non-porous substrates). Capable of high-speed, high-volume printing, flexographic printing is a versatile printing method that can be used for a wide range of applications. The choice of drying method depends on the type of ink used and the requirements of the final product. They ensure that all necessary plates, raw materials, cylinders, dies, and colours are available. The industry is expected to reach \$20 billion by 2025, growing at 4.5% per year. This guide will take you through how flexo printing works, the key parts of the process, and important technical details to help you understand it better. Step-by-Step Flexo Printing Process: Step 1: Design & Plate Making: Flexo printing starts with a digital design file, which is used to create the printing plates. Process: Designers use software like Adobe Illustrator or Esko to create print-ready files in PDF or TIFF format. Plate Making: Plates are made from either photopolymer or elastomer, each with its own advantages. Photopolymer plates are cheaper and provide high-resolution prints up to 4,000 DPI, making them ideal for detailed graphics and fine text. Elastomer plates are more durable and last 30% longer, making them the better choice for longer print runs and repeat use. Fact: Photopolymer plates can reach 4,000 DPI, while elastomer plates typically max out at 2,946 DPI, offering a balance of durability and detail. Step 2: Material Selection: Before printing starts, the machine must be cleaned, calibrated, and set up properly. Tension control and ink priming are the key to consistent prints. Leftover ink and dust can present defects like smudging and streaking. Ink: Ink types are categorized by line count: 300-700 LPI is used for fine detail, pre-press printing, and four-color images on non-porous substrates. Lower LPI (e.g., 200-400) is used for diverse substrates, making it better for solid colors and bold graphics. Plate Alignment: The alignment of the anilox roller and the printing plate is crucial to reduce misalignment and ensure consistent prints. Fact: Precise alignment is key to reduce misalignment and ensure consistent prints. Step 3: Ink Selection & Loading: Choosing the right ink affects print quality and drying time. Ink Types: Water-based inks – Fast drying, creates a glossy finish. Solvent-based inks – Weather-resistant, ideal for outdoor applications. Fact: Water-based inks cut VOC emissions by 70%, making them a top choice for eco-friendly printing. Step 4: Pre-press: Once the machine is set up, it's time to start printing. They can be used to print publications. And can be configured to carry out numerous processes at once. Once any potential issues are resolved, the printer proceeds with the main process. Each type of ink has its own benefits and drawbacks, so it is important to use the right type of ink for your particular application. It's relatively simple, versatile, and suitable for printing on a wide variety of substrates. Substrate feeding: Next, the substrate, which is usually in the form of rolls of paper or plastic film, is fed into the printing press, passing through various rollers and tension controls to ensure smooth and consistent movement through the press. They provide good colour saturation and can adhere to a variety of substrates. As flexo printing is highly efficient due to its process of applying the image directly to a flexible sheet of paper. So it's definitely something we're familiar with. Flexography is not a new process. However, it wasn't until the 1950s that flexography began to be used for printing labels and other packaging materials. With its versatility and efficiency, flexo printing has become the standard in the print production industry. Pick up any product wrapped in printed cellophane packaging and you're most likely looking at flexographic printing. The graphic artist sends the artwork to the flexo plate production department. This makes flexo an ideal printing method for packaging that needs to be moisture-resistant or airtight. Employ flexo printing techniques. Experiment with techniques like embossing or recessing text to achieve desired effects. The mounting process must be meticulously completed to ensure that the colours are precisely aligned, as this will produce accurate and vibrant prints. Flexo printing is a high-speed, high-volume printing process that is capable of printing large quantities of printed materials very quickly and efficiently. Flexo printing offers advantages such as the ability to print on various materials and high precision due to the printhead's accuracy. And flexography opens up all kinds of branding applications for us as a design agency. They are composed mainly of water and pigment, with assorted additives like defoamers and agents to aid in drying and adhesion. Previously made from rubber, flexo plates are typically made from flexible photopolymer, which is a light-sensitive material that hardens when exposed to ultraviolet (UV) light. Check it every 2-3 hours to avoid uneven prints. 3. Print Speed & Drying: Balance the print speed is too fast for the drying system, ink may smudge or not set properly. Knowing how to set up the process, control key settings, and adjust for quality helps improve print results and efficiency. If you need a fast printing machine that fits your production needs, reach out to MTEC. Flexo printing is a widely used printing process for producing high-quality prints. Drying or curing: Finally, the ink is transferred to the substrate; it must undergo a drying or curing process to become permanent. A: Flexo printing involves applying pressure to a print plate using a press, resulting in the image being printed onto the paper. They are then packed in cartons and sent to the quality department for inspection before being dispatched. The plates are essential for the effective transfer of the desired image or text onto the substrate. 6. Regular checks help reduce waste and prevent reprints. Step 5: Quality Control & Adjustments: What to Check: Registration accuracy (should be within ± 0.1 mm). Color consistency (measured with a spectrophotometer). Ink coverage (smooth and even). How to Fix Issues: Adjust anilox roller settings, ink viscosity, or printing speed as needed. Step 6: Post-Printing: After printing, products go through drying, laminating, cutting, and stacking to prepare them for final use. 1. Drying Methods: The drying process ensures ink fully sets on the material before further processing. Uses ultraviolet light to cure ink instantly. Takes 1-3 seconds, making it ideal for high-speed production. Works best with UV-curable inks for glossy and durable prints. Uses heated air to evaporate solvents in water-based and solvent inks. Takes longer than UV drying but is necessary for non-UV inks. Common in flexible packaging and food-safe printing applications. 2. Die-Cutting: Die-cutting is used to cut printed materials into specific shapes, such as labels, packaging, and stickers. Uses cylindrical dies to cut material as it moves through the machine. Best for high-speed, high-volume production. Works well on paper, thin films, and flexible materials. Uses a stationary die and a press to cut material in a punching motion. More precise than rotary die-cutting but slower. Suitable for thicker materials like corrugated board and specialty packaging. Uses a high-speed laser to cut complex shapes without physical contact. Ideal for detailed designs and intricate patterns. Slower and more expensive than traditional die-cutting, making it less common for high-volume production. Final Pro Tip: For large production runs, rotary die-cutting is the most efficient and cost-effective. This meticulous process enables precise and high-quality printing, which is essential for advertisements and labels. We work with 2 pre-pressed flexo printers in Dubai, both are presses inspected and vetted in-person by our team. If you're looking to enhance your business operations, incorporating flexo printing is a valuable proposition. Its speed and accuracy make it ideal for high-volume manufacturing, while its low environmental impact makes it a sustainable option. This saves time and labour, lowering costs. Flexographic presses are relatively low-cost, simple, and easy to run, maintain, and operate. The operator carefully sets up the machine to ensure correct printing and die cutting. In very simple terms, you can think of the flexographic printing process as a cylindrical rubber stamp, albeit an automated one. A deep-dive into flexographic inks can be found here. Cutting systems, which are usually more advanced than printing presses, are used to cut labels, tags, or other flexo products. It sits between the anilox roller on one side and the impression cylinder on the other. As the press runs, all cylinders counter-rotate. 4. Oil-based inks are the least common type of flexographic ink. And it's one more way to supercharge your brand's presence. This artwork is used to determine ink usage and placement. They are most often used for corrugated packaging. Flexo stands for flexography or flexographic printing. This process makes UV inks much more resistant to smudging and scratching, making them ideal for applications where high print quality is required. This method works for both positive and negative images. Here's a breakdown of the most important factors. 1. Anilox Roller Settings: The anilox roller controls ink transfer, which affects how much ink reaches the material and how sharp the print looks. Line Count (LPI): 800-1000 LPI – Used for fine details, halftones, and process printing. 300-500 LPI – Better for solid colors and bold graphics. Cell Volume (BCM): Higher BCM holds more ink, ideal for solid prints. Lower BCM delivers thinner ink layers, needed for detailed designs. Fact: Studies show that higher LPI rollers (600+) reduce ink usage by up to 15% while maintaining sharpness. Pro Tip: If prints look too light, try using a roller with a lower LPI to transfer more ink instead of increasing pressure. 2. Ink Viscosity & pH: Ink thickness and pH affect color consistency and drying time. This transfers the image to the substrate continuously and is repeated for each colour ink separately, in series. It was invented in the 19th century (around 1890) and has been used to print newspapers and other publications since the early 20th century. In fact, the carrier bags are no different. If you need custom shapes or prototypes, laser cutting can offer precision but at a higher cost. Key Flexo Printing Technologies & Parameters: Good flexo printing depends on controlling key settings like anilox rollers, ink viscosity, and drying speed. Each stage has its own set of procedures to follow. During the process of flexo printing, images are separated into a minimum of four process colours – cyan, magenta, yellow, and black – with the option to include spot colours and over varnishes if needed. Flexo printing is a very versatile printing process. In the pre-press stage, computer-generated artwork is created as a guide for printing. Plate mounting: Once the plates are prepared, they are mounted onto the printing press cylinders, with each colour in the design requiring a separate plate. By carefully controlling the application of ink, consistent and sharp prints can be achieved. After printing, a thorough inspection is conducted to verify that the results align with the artwork/specification provided. Use a high-quality printer: Investing in a good printer will yield better prints and prove worthwhile in the long run. It has evolved continuously since then and is now one of the most popular printing processes for labels, packaging, and other flexibly printed materials. Small adjustments can improve print quality, efficiency, and consistency. Depending on the specific application, drying can be achieved through air drying or by utilising drying systems such as hot air, infrared, ultraviolet (UV), or LED UV technologies. It is unique because of the variety of materials it can print on, including paper, cardboard, metallic foils, and plastic films like cellophane. In the main printing process, multiple layers of ink are laid down on top of each other. This eliminates the need to transfer the image to a hard surface before printing. We'll help you find the right press to keep your printing smooth and cost-effective. The main steps involved include depositing the print material, applying heat and pressure, and finally removing the print material. 2. Flexo is the printing process of choice when it comes to high-speed, high-volume printing on thin, flexible materials. Once the plates and pre-printed artwork are received at the printing press, a supervisor assigns the job to a specific machine. While it may seem simple, precise adherence to specific steps is crucial in order to achieve accurate results. How does flexographic printing work? The first step in flexo printing is to create a test sheet using a different material than the final product. To achieve optimal results in flexo printing, consider the following tips: Ensure your images are properly sized: The size of your image will affect the final print size, so it's essential to use the correct dimensions. Once the plates are created, they are sent to the press along with a pre-printed sample to ensure accuracy. These systems are particularly suited for small-scale production runs. The pressure applied between the plate and the substrate enables the ink to transfer effectively, creating the final print. This step involves precise ink transfer, tension control, and quality checks to ensure consistent results. 1. Starting the Machine & Adjusting Tension Control: Why It Matters: Proper tension control prevents wrinkles, stretching, or misalignment in the material. How It Works: The tension control system automatically adjusts rollers to maintain even pressure. Too much tension can cause the material to break or distort the print. Too little tension can lead to registration errors (misaligned colors and designs). Pro Tip: Use automatic tension control for thin films and flexible substrates, as manual adjustments are inconsistent. 2. Ink Transfer: Ink Transfer used for oil-based inks. Step 3: Pre-press: Plate Transfer: Ink to the Plate: The anilox roller picks up ink from the ink chamber. The roller's LPI (lines per inch) and cell volume determine how much ink is transferred. Pro Tip: Use lower LPI (200-400) for bold graphics and higher LPI (500-700) for detailed designs. Step 4: Pre-press: Ink Transfer: Ink to the Material: The flexo plate picks up ink from the anilox roller, transfers it to the substrate, and then prints the image. A well-set doctor blade prevents streaks, over-inking, or uneven prints. Pro Tip: Replace doctor blades regularly; a worn blade can cause ink buildup, leading to print defects. 3. Maintaining Print Quality During Production: Even after setup, the printing press needs constant monitoring to maintain quality. Check Ink Flow: Make sure ink doesn't dry too fast or run too thin, which affects color consistency. Monitor Registration: Watch for misalignment between colors and adjust if needed. Inspect Print Samples: Take random samples during production to spot streaks, ink pooling, or missing details. Final Pro Tip: If you notice ink buildup or inconsistent prints, pause production and clean the anilox roller, plate, and doctor blade before continuing. This is a highly precise process which makes flexo printing ideal for detailed and high-quality work on a variety of different substrates. Flexo printing technology offers numerous benefits for businesses, including faster turnaround times and improved print quality. A flexographic printer is a type of web press (meaning reel-fed), consisting of these main components: an impression cylinder, a flexible printing plate, an anilox roller, a fountain cylinder, and an attached ink tray by EC Tran 71 – Own work, CC BY-SA 4.0. The flexography process begins with the creation of a flexo printing plate. There are four common varieties of flexographic inks: water-based, solvent-based, ultraviolet (UV), and oil-based.

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