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Rotogravure printing process pdf

Gravure printing originated in the early nineteenth century. The process did not become widespread until the early twentieth century, however, when newspapers embraced this new technology. Characterized by quality halftone reproductions printed at high speed on a variety of paper stock, gravure printing allowed the newspaper industry to reproduce photographs and art work on a mass scale on inexpensive newsprint paper. The technology adopted by newspapers is more precisely called rotogravure—gravure printing from an etched cylinder as opposed to a flat plate. Unlike the letterpress, which uses raised or relief printing, gravure uses intaglio printing, in which metal is etched with recessed "cells" to hold the ink. The process was first used in art reproduction because of its high quality tonal gradation and color depth. From this process evolved photogravure—gravure printing where a plate is etched from a photographic image. Fox Talbot of Great Britain produced the first photographic negatives in 1852. Karl Klic (Klitsch or Klietsch) modified Talbot's process in 1879 by using copper cylinders (instead of plates) for rotary printing and rotogravure was born. Newspapers offered an efficient way to use rotogravure printing because of the industry's economies of scale. Etching a metal cylinder to produce a page of rotogravure was expensive, and high volume printing was essential in order to reduce the cost per page. Publishers who invested in the new technology, however, were rewarded. Rotogravure printing is so consistent that color variations are rare, ink does not smear, and pages can be handled (and bundled for shipping) immediately. Newly equipped newspapers were able to print large pictorial sections that increased readership and advertising revenue. Initially Karl Klic kept his new printing process secret, even as his Rembrandt Intaglio Printing Company of London (co-owned with Samuel Fawcett) popularized the production of gravure prints. The first daily newspaper to publish both letterpress and gravure printed pages together was Freiburger Zeitung [Freiburg, Germany] in 1910, for its illustrated Easter Sunday edition. On Christmas, 1912, the New York Times published the first complete rotogravure section and similar pictorial sections began to appear in any newspaper able to afford the cost of the press and cylinders. By the end of World War I, forty-seven American newspapers included rotogravures in their Sunday issues, a number that increased as the financial benefits of rotogravure became evident to newspaper publishers. Rotogravure sections published during the war documented the war effort, popularized classic paintings, detailed the accomplishments of high society, and captured the carefree life of everyday Americans that co-existed with the ferocity of World War I. By 1932 a George Gallup "Survey of Reader Interest in Various Sections of Sunday Newspapers to Determine the Relative Value of Rotogravure as an Advertising Medium" found that rotogravures were the most widely read sections of the paper and that advertisements there were three times more likely to be seen by readers than in any other section. The rotogravure process is still used for commercial printing of magazines, postcards, and cardboard product packaging. Top "Washington's Coffee." Advertisement. New York Tribune, June 22, 1919, 4. "Ryzon, the Perfect Baking Powder." New York Times, June 11, 1916, [12]. Let's move on with our new series #PrintingProcesses and one of the oldest printing processes still in use today: gravure printing. As early as the Middle Ages, people produced copperplate engravings (a graphic gravure printing process) with an image depicted in the recesses. Since then, gravure printing has developed over a long time and is used today for banknotes, cosmetics packaging, magazines and many more. Are you a newcomer to the world of printing and don't know where to start? Or maybe just a devoted print enthusiast who wants to freshen up on the basics? Then you've come to the right place! With our series #PrintingProcesses we're introducing you to all the basic – yet very important – techniques and fundamental knowledge of the print technologies we know and utilize to this day. In this third edition it's all about gravure printing, one of the oldest printing processes still in use today. From the First Printing Plates to Print Runs of More Than 300,000 Copies Even if the first printing plates were developed in the Middle Ages – the cornerstone for gravure printing was laid in 1719, when the Frankfurt-based Jakob Christoph Le Bron invented the three-colour printing with its copper mezzotint technique. He used the depressions of these printing plates for ink transfers and enabled the printing of up to 1000 copies per day. Later on, Jacob Perkins has patented the steel engraving that provides finer print results compared to the previously used copper. Fonts and images were thus reproduced more clearly and finely. Until today gravure printing has been improved properly but how does it work exactly? Gravure printing is a demanding printing process in which the print image is engraved as a depression in a printing plate and dipped in ink. Since only the resulting indentation is to be printed, the excess ink is removed to a basin with a squeegee or wiper and only sticks to the deeper areas, the actual print elements. In the last step the ink is transferred to the printing medium with strong pressure and the help of the absorbent force of the paper. After the printing, the paper must be dried, as the substrate often needs to be damp to accept the ink. Together with the wiped ink the solvents from the printing ink can be recycled and reused. The colour depth of the resulting print image incidentally depends on the depth of the depressions, the so-called cups which enable the representation of different color shades. There are different techniques for gravure printing: rotary printing and sheet-fed printing are the most famous one. The latter is much less common and is only used for special jobs such as printing varnishes or metallic inks. Rotary printing (from the roll), on the other hand, is very widespread and is used especially for the production of high print runs of more than 300,000 copies. The following video shows the mechanism behind gravure printing: A Printing Process with High Quality Standards Now you know how gravure printing was invented and how it works but what makes it so popular and special? You can recognise a gravure print by the serrated edge of the letters, the so-called sawtooth effect, which is created by the cups. Since the substrate draws ink not only from a small part but from the entire cup, there are no sharp edges. Besides, the substrate has a strikingly smooth and soft surface, whether it's made of film or paper. Maybe you recognised it from how a magazine feels in your hands. Gravure printing is characterised by high quality and durability. The dimensions of the cups determine the ink distribution and define exactly how much ink the cylinder takes up at which point. This precision affects the halftones, the colour nuances of your printed product. Gravure printing actually reproduces the colour gradations. Even though the gravure printing process is very old, it still maintains its usefulness today with high print qualities, an even ink application and rich colour depths. Therefore it will be quite a while before gravure is seen only as a historical printing process. Until then take a look at our other episodes of #PrintingProfessions. Commercial printing relies on a variety of technologies to print on different substrates, but two of the more popular techniques are flexographic printing and gravure printing. This post is designed to take a closer look at the key differences in flexo printing vs. gravure printing. Better understand these two printing technologies will ensure that you use the right process for your application. (ICYMI: We've also discussed the differences between Flexo Printing and Offset Printing Flexo Printing Vs. Gravure Printing: The disadvantages and advantages of gravure printing and flexo printing involve several factors: Cost and lead time Substrates Ink Environmental considerations Quality For those not familiar with one or the other, here's a quick rundown of the flexo and gravure printing processes: Basics of Flexo Printing Flexo typically utilizes a polymer or elastomer image carrier. This could be a: The image carrier is engraved to create the raised design of the final desired print. Ink is then transferred from the inkwell via an anilox roller onto the image carrier, where it is then printed onto the substrate. Flexo printing is more commonly associated with uses in flexible plastics and other non-porous materials such as film, labels, foil, and other packaging. Flexo is noted for producing exemplary print with fine line and text detail. Basics of Gravure Printing The rotogravure printing process (commonly shortened to gravure) is a method of intaglio printing. Gravure printing works by applying ink to a substrate with the use of a metal plate that is typically mounted onto a cylinder. This plate is often made of copper or chrome. The image or text that is intended for printing is typically laser etched into said metal plate, a process that often delivers high quality and precise results with good repeatability. The Similarities But before we get into the differences, however, let's take a look at a few key similarities: Both technologies involve the creation of printing sleeves, cylinders, and plates. Both can perform long-run, high-volume printing, though flexo can be cost-effective for shorter runs. Both are able to produce exceptional results. Flexo Printing vs. Gravure Printing: Key Differences Now that we've gone over the similarities between flexo and gravure, and explained the basic process of each, it's time to take a look at some of the key differences: Cost and Lead Time: Gravure image carriers are typically much more expensive than flexo image carriers, making the number of prints required to break even much higher. Gravure, however, has a longer press run time, as the cylinders do not require as frequent changing as those in the flexo printing process. Gravure lead time is usually 3-4 times that of flexo in the time it takes to manufacture the image carrier. Substrates: One of the limitations of gravure printing is that it is generally better suited for porous substrates. This is one of the reasons that gravure is best suited for high detail printing on applications such as magazine covers. That isn't the case with flexo printing, which is able to print on both porous and non-porous substrates, making the technology ideal for everything from film to paperboard. In you're specifically measuring flexo vs. gravure in packaging printing, you'll usually find that flexo wins. Inks: Another key differentiator in flexo vs. gravure is the range of inks flexo is able to print with. Gravure printing problems include a limited number of inks with which it's compatible. In most cases, flexo printing ink is the superior choice due to the ease of printing with a wider variety of inks. Gravure requires much more ink per print, which can drive up the cost of printing. Environmental Considerations: Due to the fact that gravure is traditionally associated with solvent based inks (although water based ink capabilities have been evolving), flexo is commonly considered the "greener" options. There are generally more flexo printing solutions for VOC (volatile organic compound) problems, and the press operations are associated with more environmentally friendly practices Quality: Gravure was once considered best for fine detail and tonal work, but flexo technology is further enabling prints with higher resolution and detail as it evolves -- enabling it to move into print jobs that were previously associated exclusively with gravure. Consider the other pros and cons of gravure printing and weigh them against the slight (if any) different in end quality you'll get with flexo. Flexo or Gravure: The Final Decision As you can see, there are many differences between flexo and gravure printing. Which process is right for you? It largely depends on the job, substrate, and a variety of other factors of the job you're printing. Don't substitute one printing process for the other without thinking it through with your internal team and an external printing expert. (Editor's note: This blog post was originally published in August 2018 and was recently updated.) Skip to content Just like offset and flexography printing, gravure printing is realised by using a rotary printing press. This means the printing process consists of rotating cylinders instead of sheets pressed on the paper. But in this case the image carrier is different when compared to the other two techniques. This technique involves engraving the image onto an image carrier. The cylinder which contains the image gets engraved, which means that small holes are being made into the cylinder which represent the print image. As mentioned before, flexo works with a cliché which has raised printing surfaces. The raised surfaces pick up the ink and transfer it to the substrate. In gravure printing it works the other way around; all the small holes in the gravure cylinder get filled with ink and directly transfer it onto the printing substrate. So in this case, the image carrier rotates directly through the ink fountain/ink pan. Other printing techniques make use of separate cylinders which transfer the ink to the image carrier and eventually print it on the substrate. Gravure cylinders print directly on the substrate. Advantages of (roto)gravure printing Production speed: rotogravure can reach a very high printing speed Print quality: gravure printing has a consistent print quality Durability: the gravure cylinders can be used for several (repeat) print jobs Disadvantages of (roto)gravure printing High costs for producing the gravure cylinder High set-up costs: this means that large orders are profitable Rotogravure vs Offset Rotogravure Offset Print quality High High Run length Long Short / medium / long Cylinder / plate costs High Low Job changeovers Long Short Our presses, the Vision and the Thallo, are hybrid machines. This means that all kinds of modules can be added to the web offset press. For example, a rotogravure module can easily be integrated in the machine for e.g. metallic effects. The gravure printing process consists of: Ink fountain Gravure cylinder (image carrier) Doctor blade (scraping off the unnecessary thick layer of ink before it is transferred to the substrate) Impression cylinder Printing process "Gravure" redirects here. For the similar photographic process using copper plates, see Photogravure. For the type of Japanese model, see Gravure idol. This article includes a list of general references, but it remains largely unverified because it lacks sufficient corresponding inline citations. Please help to improve this article by introducing more precise citations. (August 2012) (Learn how and when to remove this template message) Diagram of rotogravure process Rotogravure portrait of Charles Darwin, c. 1880 Rotogravure (or gravure for short) is a type of intaglio printing process, which involves engraving the image onto an image carrier. In gravure printing, the image is engraved onto a cylinder because, like offset printing and flexography, it uses a rotary printing press. Once a staple of newspaper photo features, the rotogravure process is still used for commercial printing of magazines, postcards, and corrugated (cardboard) and other product packaging. History and development In the 19th century, a number of developments in photography allowed the production of photo-mechanical printing plates. W H Fox Talbot mentions in 1852 the use of a textile in the photographic process to create half-tones in the printing plate.[1]:19–21 A French patent in 1860 describes a reel-fed gravure press.[1]:22 A collaboration between Klic and Fawcett in Lancaster resulted in the founding of the Rembrandt Intaglio Printing Company in 1895, which company produced art prints. In 1906 they marketed the first multi-colour gravure print.[1]:30–50 In 1912 Messrs Bruckman in Munich produced proofs for Bavarian postage stamps which went into production in 1914. Also in 1912 newspaper supplements printed by reel-fed gravure were on sale in London and Berlin (The Illustrated London News and Der Weltspiegel).[1]:128 Irving Berlin's song "Easter Parade" specifically refers to these type of supplements in the lines "the photographers will snap us, and you'll find that you're in the rotogravure". And the song "Hooray for Hollywood" contains the line "...armed with photos from local rotos" referring to young actresses hoping to make it in the movie industry. In 1976, ex-Beatle Ringo Starr released an album titled Ringo's Rotogravure. In 1932 a George Gallup "Survey of Reader Interest in Various Sections of Sunday Newspapers to Determine the Relative Value of Rotogravure as an Advertising Medium" found that these special rotogravures were the most widely read sections of the paper and that advertisements there were three times more likely to be seen by readers than in any other section. Gravure is one of several printing techniques being actively used in the new field of printed electronics. Process and components In direct gravure printing, the ink is applied directly to the cylinder and from the cylinder it is transferred to the substrate. One printing unit consists of the following components: an engraved cylinder (also known as "gravure cylinder") whose circumference can differ according to the layout of the product being made. an ink fountain a doctor blade assembly an impression roller a dryer For indirect gravure processes, the engraved cylinder transfers ink in the desired areas to a transfer roller, and the transfer roller transfers it to the substrate. Engraved cylinder The first step of Gravure is to create the cylinder with the engraved images that need to be printed: the engraving process will create on the cylinder surface the cells that will contain the ink in order to transfer it to the paper. Since the amount of ink contained in the cells corresponds to different colour intensities on the paper, the dimensions of the cells must be carefully set: deeper or larger cells will produce more intense colours whereas smaller cells will produce less intense ones. There are three methods of photoengraving that have been used for engraving of gravure cylinders, where the cell open size or the depth of cells can be uniform or variable: Method cell size cell depth Conventional uniform variable "Two positive" or "Lateral hard dot" variable variable Direct transfer variable uniform Gravure cylinders are usually made of steel and plated with copper, though other materials, e.g. ceramics can also be used. The desired pattern is achieved by engraving with a laser or a diamond tool, or by chemical etching. If the cylinder is chemically etched, a resist (in the form of a negative image) is transferred to the cylinder before etching. The resist protects the non-image areas of the cylinder from the etchant. After etching, the resist is stripped off. The operation is analogous to the manufacture of printed circuit boards. Following engraving, the cylinder is proofed and tested, reworked if necessary, and then chrome plated. Process While the press is in operation, the engraved cylinder is partially immersed in the ink tray, filling the recessed cells. As the cylinder rotates, it draws excess ink onto its surface and into the cells. Acting as a squeegee, the doctor blade scrapes the cylinder before it makes contact with the paper, removing the excess ink from the non-printing (non-recessed) areas and leaving in the cells the right amount of ink required. The position of the blade relative to the nip is normally variable. Next, the substrate gets sandwiched between the impression roller and the gravure cylinder: this is where the ink gets transferred from the recessed cells to the web. The purpose of the impression roller is to apply force, ensuring that the entire substrate is brought into contact with the gravure cylinder, which in turn ensures even and maximum coverage of the ink. Once in contact with the substrate, the ink's surface tension pulls (part of) the ink out of the cell and transfers it to the substrate. Then the inked substrate goes through a dryer because it must be completely dry before going through the next color unit and accepting another coat of ink. A rotogravure printing press has one printing unit for each color, typically CMYK or cyan, magenta, yellow and key (printing terminology for black), but the number of units varies depending on what colors are required to produce the final image.[2] Features Because gravure is capable of transferring more ink to the paper than most other printing processes, it is noted for its remarkable density range (light to shadow) and hence is a process of choice for fine art and photography reproduction, though not typically as clean an image as that of offset lithography. A shortcoming of gravure is that all images, including type and "solids," are actually printed as dots, and unless the ink and substrate combination is set up to allow solid areas to flow together, the screen pattern of these dots can be visible to the naked eye. Gravure is an industrial printing process capable of consistent high quality printing. Since the Gravure printing process requires the creation of one cylinder for each colour of the final image, it is expensive for short runs and best suited for high volume printing. Typical uses include long-run magazines in excess of 1 million copies, mail order catalogs, consumer packaging, Sunday newspaper ad inserts, wallpaper and laminates for furniture where quality and consistency are desired. Another application area of gravure printing is in the flexible-packaging sector. A wide range of substrates such as polyethylene, polypropylene, polyester, BOPP, etc. can be printed in the gravure press. Gravure printing is one of the common processes used in the converting industry. Rotogravure presses for publication run at 45 feet (14 m) per second and more, with paper reel widths of over 10 feet (3 m), enabling an eight-unit press to print about seven million four-color pages per hour. The vast majority of gravure presses print on rolls (also known as webs) of paper or other substrates, rather than sheets. (Sheetfed gravure is a small, specialty market.) Rotary gravure presses are the fastest and widest presses in operation, printing everything from narrow labels to 12-foot-wide (3.66-meter-wide) rolls of vinyl flooring. For maximum efficiency, gravure presses operate at high speeds producing large diameter, wide rolls. These are then cut or slit down to the finished roll size on a slitting machine or slitter rewinder. Additional operations may be in line with a gravure press, such as saddle stitching facilities for magazine or brochure work. Advantages Although the rotogravure printing process is not the most popular printing process used in flexible-packaging manufacturing, it does have the ability to print on thin film such as polyester, OPP, nylon, and PE, which come in a wide range of thicknesses, commonly 10 to 30 micrometers. Other appreciated features include: printing cylinders that can last through large-volume runs without the image degrading good quality image reproduction low per-unit costs running high volume production Disadvantages Shortcomings of the gravure printing process include: high start-up costs: hundreds of thousands of copies needed to make it profitable rasterized lines and texts long lead time for cylinder preparation, which is offsite as the techniques used are so specialized See also Flexography Offset printing Photogravure Roll Slitting Rotary printing press Notes ^ a b c d Lilien, Otto M (1972). 'History of Industrial Gravure Printing up to 1920'. Lund Humphries London. ^ "Rotogravure printing process". BOBST. Retrieved 11 November 2020. External links European Rotogravure Association Gravure Association of the Americas Heliograph holding Retrieved from "

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