



Printing on linen

Linen types and specifications

The term 'bound in linen' says more about the quality of a book than about the fabric used in the binding. Neither will it make any difference to the reader whether the fabric made suitable for this application is actually composed of cotton or rayon yarns. We too will therefore continue to use the established designation of 'linen'.

Linen must meet a number of requirements, both with regard to the mechanized production in the bookbindery and the later use by the reader.

It must:

- not be particularly susceptible to scratching
- not give off lint
- not allow adhesive to seep through
- not curl during the mechanized binding process or the preceding offset or screen printing process
- bond well when the prescribed adhesives are applied
- be suitable for printing with foil or ink
- be strong at the joint.

The linen type is determined by:

- the strength and thickness of the threads
- the type of yarn, the method of weaving and the number of threads per centimeter
- the finish, for strengthening of the fabric
- the surface treatment
- the lining with a thin layer of paper on the underside
- the coating of the top side and/or underside.

The covering prevents the adhesive from seeping through. This layer of paper also stops the greyboard showing through and increases the stiffness of the linen, which is beneficial when sheets are printed in advance, by offset or screen printing.

To make a well-founded choice from the different types of linen, it is important to know a few standard specifications.

A fabric consists of warp threads in the length of the roll and weft threads interwoven at right angles to these. The number of threads per running centimeter provides a further indication of the fabric's stiffness, in addition to the thread thickness.

The thickness of the yarns used is measured and stated using the metric system (Nm). This indicates how many meters of thread are used in one gram. Nm 40 means that 40 meters of the yarn weigh 1g. The higher the number, the finer the yarn. In delicate fabrics, rayon gives the best effects. The most widely applied gram-weight for the lining paper is 30 g/m².

For linen types such as Dubletta and Buckram Light, 20 g/m² is sufficient.

Thicker paper and cardboard can also be used for the lining in the manufacturing process. Finally, heavier Buckrams are not lined with paper. These are applied with a coating to prevent seepage of the adhesive.

The choice of printing techniques

The large selection of binding materials available enables the designer to give a hard cover book the 'packaging' it deserves. Over time, linen has definitely proved its worth as a binding material. For many book-lovers and readers, a book simply must be bound in linen if it is to be attractive, strong and valuable. L. van Heek Textiles has done much to give designers or publishers a real choice from the various types of linen and contemporary colors. One of the advantages linen has over other binding materials is its image as a natural product: its feel and texture after weaving. But as well as these qualities, a linen-bound book must also display the title on the spine and front cover. In the case of a mechanically produced binding, it is given the form, style and printing intended by the designer within a matter of seconds. In an industrial process, the application of the functional cover and spine title and any illustrations or decoration must be predictable.

The current techniques of printing on linen for book bindings can be divided into printing before and after the binding has been made. The cut-to-size linen can be printed by offset and screen. Blind stamping or embossing can also be applied, and with the aid of hot-press foil, the title and cover illustrations can be printed in metal or colored foil. Combinations of these printing techniques on the same binding are perfectly possible. For example, the title on the spine and front cover can be printed in foil, while an illustrated sticker, printed by offset, is applied over a blind stamp.

Creative designers and inventive bookbinders have succeeded in producing a myriad of beautiful and surprising bindings. It is an exciting challenge to match the design to the available materials, such as linen, foil, boards, headbands, bookmarks and end papers, and the appropriate stamps and printing techniques, in close consultation between the designer and bookbinder. And when special print runs call for this, the time-honored methods of manual craftsmanship will not be shunned. In the following chapters, attention will be given to every subject relating to the printing of linen, emphasizing on techniques using foil.

Prior consultation between designer, printer and bookbinder

The designer must take into account factors resulting from the mechanized production of books and the materials used in this. It is also of great importance that the binding is appropriate to the content: 'The binding reflects the content of a book'. There is a world of difference between a richly decorated anniversary publication and a businesslike statute book bound in dark-colored linen. The material selection of linen is another major factor. In contrast to paper, for example, the non-printed linen surface performs a definite function. The difference between finely woven Printex and Buckram or Natuurlinnen is great. The printing of the title on the spine and cover and any required ornamentation must be adapted to the linen's structure.

For the application of a border on the front cover and spine, the thickness of the weft threads also needs to be taken into account. This can result in substantial height differences in the case of heavyweight linens, especially on the spine.

When printing in foil, several colors of foil or a blind imprint can be applied in one machine operation. But this may have consequences for the positioning of e.g. the spine title. A finely drawn illustration or drawing by hand will lose some of its delicacy after printing in metal or colored foil. Due to the heavy pressure required, a more definite imprint is produced than intended. In such instances, offset printing prior to binding is the method to select. This can give the book an added dimension; particularly as the printer is then free to apply any color desired and can work with screened images and/or color gradients. Note that large solid areas or texts printed in colored foil are highly susceptible to damage. The layer of color is easily scratched, disfiguring the book's appearance.

Stickers, printed in advance by offset, can be excellently combined with foil printing. Applying such labels remains a manual task, and is therefore quite expensive. On the other hand, if the application of these labels makes a dust jacket superfluous, then part of the budget released from this has been well spent.

Foil printing

Foil printing on linen is the result of applying a relief in the surface of a book binding, an album or a cardboard box. The heated embossing stamp used in this process causes localized material deformation at the same time as the transfer of the foil particles. If stamping occurs without the use of foil, a blind imprint is created due to the pressure and the scorching or discoloration of the material. When the embossing stamp is engraved with differing depths, a relief print is the result. It used to be the case that stamps for the color-printing of bindings were dipped in ink and then pressed cold onto the material. For gilding, extremely thin gold leaf was used. Not only was the application an intricate and time-consuming task, the excess gold also had to be wiped off by hand.

Nowadays, a wide selection of colored and metal foils is available that are suitable for use on linen. These are always applied using heated stamps. Foil stamping is therefore a dry printing technique. The layers of foil used in the process are applied to the linen in dry condition and require no further treatment. Depending on the text or illustrations, the desired print is made by exerting a high or extremely high pressure. This produces a relatively deep 'dent' or impression in the linen and board of the binding. The thickness of the threads used and the fineness of the fabric determine the sharpness of the print. The most important factors in foil printing are: the linen used as the covering material, the type of foil, the compressive stress, the stamp and its temperature and the duration of the pressure. The foil print is produced due to the raised sections in the stamp which press the foil into the binding. The heat of the stamp frees the foil to be transferred from the carrier and activates the adhesive power that causes the foil to bond to the linen.

The applied pressure ensures that the colored or metal film of the foil remains bonded to the linen. The creation of a dent results in an additional advantage: the foil is applied at depth, which means it does not rub off as easily and is better protected against further damage. The required compressive stress, duration of the pressure, the temperature of the stamp and the foil must be

adapted to the delicacy of the print and the characteristics of the fabric. It is important that the board used has a smooth surface and good hardness. In the case of very light-colored linens, light-colored board should also be applied. After stamping, the partially used foil is fed through and rolled up by machine. The success of this 'press-through' system depends on the foil being released from the carrier, the creation of a sharp imprint and good adhesion of foil and linen.

A variety of effects can be produced on linen by applying different types of foil. Colored foil with a mat or higher-gloss finish can be used. Gold and silver foil is also available in mat, satin and high gloss. On linen, satin and mat foils are often more attractive than foils with a high gloss finish. A relatively heavy imprint for a title frame in mat foil ensures that the structure of the linen is smoothed out completely.

In a later production process, a sharply defined title in small lettering can be printed over this, using gold or silver foil. If this title were printed directly onto the linen, there would be a high likelihood of certain sections of the letters being filled in. Printing with stamps in which the text has been cut away is another attractive option. The title is then visible in relief. Gold and silver foils are more suitable than colored foil for this application. These metal foils give better coverage than colored foil, produce a sharper print and are more scratch-resistant.

Foil printing is widely recognized as an environmentally friendly printing technique. The absence of solvents and dust is a further advantage. The used foil remnants can be disposed of along with the normal waste, and the recycling of paper products printed with foil is no problem whatsoever.

Composition of the embossing foil

Embossing or hot-press foil consists of various layers. The thickness and number of these layers determines the actual application. The carrier acts as the base layer and transport medium for the other layers. Strong polyester film of 12 microns is generally used as the carrier, due to its special properties of good dimensional stability, elasticity and heat-resistance. The foil is unrolled and fed through the gilding press under tension, and comes into contact with the heated stamps during the stamping process, after which it is re-rolled. The thinner the carrier, the sharper the subsequent print on the linen.

The separation layer or release coating ensures that layers applied over each other for the print and adhesion on the linen are released from the carrier and transferred to the stamp, without damage.

A colorless wax with a melting point of 55-70°C is used for this separation layer. This is completely dissolved due to the heat of the stamp. Naturally, the minimum temperature of the stamp must exceed the melting point of the wax. The thickness of this wax layer determines how easily the foil comes loose from the carrier. A thick layer of wax is required for easy separation. This 'oily' foil is used for the printing of large solid areas and heavy texts. A thin separation layer enables sharp, small characters or illustrations to be printed on linens with a fine structure. The thickness of the wax layer is then 0.1 to 0.2 microns.

The top or colored coating of metal foil has a thickness of 1.0 microns. This coating is usually colored, and therefore partially determines the color of the

subsequent print. The coating also protects the underlying layer of aluminum against oxidation and makes the final print colorfast and resistant to rubbing. The difference between silver and gold foil is that in the latter type, the transparent top coating is yellow, which colors the aluminum layer. The remaining specifications such as the finish (mat, satin or gloss) and weather-resistance are also determined by this top coating.

The aluminum coating is applied under vacuum at extremely high temperatures and condenses during cooling. The result is a very thin and uniform opaque metal film.

The adhesive coating or bonding layer is 1.0 to 1.3 microns thick and determines the degree to which the foil bonds to the substrate. This layer consists of an adhesive that is melted, and is thereby activated, by the heat of the stamp. The adhesion on the linen must be stronger than the adhesion on the carrier. The relatively impervious adhesive coating also seals the various layers of foil, in addition to ensuring the bond with the linen. Coarser varieties of linen require a thicker adhesive layer, which also evens out irregularities in the substrate. Linens with a fine or smooth structure can be printed with a thinner adhesive layer. Foil manufacturers often give the various adhesive coatings a different color, so that they can be recognized by the user.

Pigment or colored foil has the same structure as described above. The top coating and the metalised film are combined to form a pigment-rich, thicker colored layer. The lighter the color, the coarser the pigments used.

Types of foil

The foil type is determined by the optically active layers. Metalised and colored foils are important for printing on linen. The optically active layers of the unvaporized aluminum foil are sealed with a transparent coat of lacquer: the top coating. This coating protects the metal film and provides the sheen and in some instances, the color. By using a colorless lacquer, the aluminum remains visible, which we see as a reflective silver sheen. The application of a transparent yellow lacquer results in gold foil. Top coatings in other colors produce different types of high gloss foil. On linen, high gloss foil is suitable for a small line of text, but not for the printing of large solid areas.

Furthermore, the adhesion to the linen is not optimal with this type of foil.

The wax and colored or dyed coatings are applied before the production of foil with the aid of ceramic or chrome-plated steel rollers. The extremely uniform application can be controlled to a thickness starting at 0.01 to 0.02 microns. In many instances, several layers are applied over each other in a single machining operation, with the aid of forced drying. The metalised effect is obtained through vacuum evaporation. The thickness of this layer is even smaller. In a standard roll of foil of 0.61 x 61 m, two grams of aluminum is sufficient to produce the silver or gold effect!

Ordering color charts and foil

Upon request, all foil suppliers will provide extensive color charts to bookbinders, designers, publishers and printers, to help them make a selection from the many different colors and types. Although much has been done to match the most widely used printing colors and covering materials, designers are advised to select foil colors on the basis of those shown in the color chart. The mixing of colors, which occurs in offset and silk-screen printing, is not

possible in foil printing. It is also inadvisable to use two colors from different manufacturers during a single printing operation.

Not all the types of colored foil shown in the color chart will be suitable for linen. In most cases, this is indicated by a particular code. The demand for foil for use in linen printing is relatively low compared to other applications. It is therefore advisable to contact the supplier in advance and enquire about suitability, amounts in stock and the delivery time. Sample rollers are always available to carry out press trials on the linen involved. The color on the linen can differ from the color on the chart, particularly in the case of light foil colors. It is therefore convenient for the bookbinder if the designer and/or printer use the same color chart. Correspondence with the aid of code numbers is effective and prevents mistakes. Always check whether a particular 'selected' color is still part of the product line. If so, reservation is recommended. It is especially important in batch productions to take into account the timely availability of a specific colored foil. Commissioning the manufacture of foil is a lengthy and expensive process. The minimum order for manufactured foil is generally 100 master rolls of 0,61 x 122 m.

The length and width of foil destined for use in a bookbindery is adapted to the gilding presses that will be employed. Rolls are mainly ordered in the standard width of 610 mm or 24 inches.

In special cases, widths of 670, 760 or 1220 mm are also available.

The standard roll length is 61 meters (200 feet) or a multiple thereof. To calculate the required amount, foil spooling charts can generally be obtained from the supplier. The supplier can also cut the rolls to the required width.

Bookbinders normally cut widely used standard varieties to size themselves.

The product label on the roll is important for the processing of the foil. Without this indication, all silver and gold foils look alike. The article code and batch number are also stated on the label. These will certainly be requested for repeat orders. All the important production data is recorded in the coding.

The names of the best-known suppliers of metal and colored foil for printing on linen are given at the end of this book.

Technical specifications and foil characteristics

In some instances the foil printing must be extremely precise; in others, a large solid area must be covered. For this reason, a large number of different foils are available on the market, with just as many differing characteristics. In the printing of bindings, the bookbinder mostly has to deal with a combination of title and decoration. A universally applicable foil is the goal of every foil manufacturer, but the development of such a product probably lies far in the future.....

Upon request, all foil suppliers will provide the technical specifications for the types in their product line. The information consists of technical data and recommendations for processing and application.

The following will be given:

- The adhesion and suitability for use on the given surfaces, such as linen, printed covers, paper, labels, synthetic leather, leather, PVC, or laminated sheets.
- The edge sharpness of the print.
- The suitability for printing fine and medium texts.
- Example applications, such as: linen bindings, covers or labels.

- Embossing temperature for the processing in knuckle-joint or cylinder presses.
- Color availability and further specification per type of foil.

This information provides a guideline only, and is subject to change. A trial print is always recommended. With regard to the equipment to be used, the printing or refinement of the material and the skill of the printer are aspects, which differ too widely to provide an all-encompassing recommendation.

Foil suppliers familiar with our material are:

APO Foils	www.apigroup.com
KURZ	www.kurz.de
CFC OESER	www.cfcintl.com

Binding stamps

In the past, the bookbinder would print bindings using the individual letters, lines, ornaments and stamps he had in stock. A variety of letter types, in serif and sans serif, with different faces, enabled the bookbinder to create a binding appropriate to the typography used in the interior. Nowadays, designers are no longer restricted to existing lettering material or particular stamps. They can create any design they wish in order to match the book's binding to the style of its content, by having the stamps custom-made for the binding material in question.

Stamps for printing on linen bindings can be manufactured from light metal or brass. Magnesium stamps are etched and brass stamps engraved.

The light metal of magnesium stamps is easily etched away during the etching procedure, which results in a good-quality binding stamp. After the necessary print image has been applied photographically, the magnesium stamp is produced on a large plate, together with others, and then sawn free. A trial print using ink on paper is carried out for every stamp on a test press. The customer or bookbinder can then perform the necessary initial inspection on the basis of this print.

The surface of magnesium stamps is sufficiently compact to make them suitable for small to medium print runs. In many instances, the decision will be taken to have two identical stamps made for a print run, instead of just one. The reasons for this are price and delivery time. The stamp manufacturer requires images to be supplied on positive film.

Brass stamps are considerably more expensive and have a longer delivery time. Like magnesium stamps, they are made in the standard thickness of 7 mm. This relatively small height is designed to withstand the high compressive stress. The brass used in binding stamps is an alloy consisting of roughly 58% copper, 40% zinc and 2% lead. It is therefore a hard metal, which can be machined quickly and precisely by the rotating mills on the engraving machine. This prevents burrs and creates a more regular edge. Moreover, brass has good wear-resistance, is an excellent heat conductor and can withstand high temperatures, which is necessary in high-speed printing machines. Due to its densely compacted surface, brass gives a high gloss to gold, silver or colored foil, which is visibly superior to the effect produced by magnesium stamps.

A good-quality engraved stamp must meet the following requirements: the contour and large sections must be milled out to at least 2 mm; the depth in the small sections must be maximized; and the slope of the print image must be as steep as possible everywhere. Brass stamps used to be engraved on pantograph engraving machines. Nowadays, the engraving machines are computer controlled, which means that texts and/or images can be supplied on line in digital format. The major advantages of this are the high degree of precision attainable and the knowledge that in emergencies, when a stamp is no longer useable, the stamp manufacturer will be able to make a new one quickly. The stamp manufacturer can also easily adjust the width of the text to a different spine width, without altering the height of the letter. In special cases, stamps can be engraved with a particular design or figure. These enable gloss and mat surfaces to be applied in a single image.

The difference in price between etched and engraved stamps has become smaller thanks to modern production methods. This means that brass stamps tend to be selected for quality books and small print runs.

Specially adapted stamps can also be made for embossing. Surprising printing results are achieved by engraving the stamp at different levels. After the blind stamping, light falling on the book creates a varying effect of light and shadow. In the case of high-precision foil printing, the stamp manufacturer must take into account the expansion of the heated stamps.

If there are no stamp manufacturers in your area, the stamps you require can be obtained by other means. For example, Universal Engraving, Inc of Kansas USA provides substantial information on their website at www.universalengraving.com. All the stamps in their line are displayed and described. An on-line ordering system is also available, which allows you to send the information relating to the manufacture of a stamp via e-mail and an attachment. By indicating the type and depth of the engraving required, the most complicated varieties of stamps can even be made at this 'remote' location, enabling clients all over the world to benefit from the latest developments in this field.

Mounting of stamps in the gilding press

Stamps or individual letters can be secured with the aid of a special inclusion plate between the frames and end pieces. This method is mainly applied at binderies where the bindings are made by hand.

Bindings for a series of books are printed on a semi- or fully-automatic gilding press, in which the stamps are generally secured by means of melting tape on the heating plate.

To prevent differences in height during the pressing and release of the stamp, it is advisable to cover the entire stamp with tape. After a warming-up period of at least one minute at 100 °C, the stamp is solidly fixed to the printing plate.

The latest gilding presses are supplied with a special fastening plate with pre-drilled holes. These holes are drilled adjacent to and above each other at fixed intervals of 10 mm. By programming this grid on the computer, the stamp manufacturer can etch the fixing holes at the correct positions, outside the print image, during the engraving process. The holes are drilled out afterwards. The major advantage of this is that the press gilder can position and secure the

stamps for the cover and spine with extreme accuracy, outside the machine. This significantly reduces the set-up time.

Embossing or gilding presses

In binderies where books are bound by hand, manually operated gilding presses are used to stamp a few issues or small batches. Depending on the make and type, these machines have a printing surface of approximately 21 x 30 cm. These are mechanical devices equipped with a knuckle-joint press and lever. The press gilder himself determines the duration of the pressure by pulling the lever slowly or quickly. The machine may be equipped with an adjustable foil spooling device; a thermostat is standard.

A simple spine or cover title can also be printed using a Prägnant. This is a manually operated knuckle-joint press in which the foil is fed through by hand on a narrow roller. The individual letters or the ornament is placed line-by-line in a heated composition stick and then pressed onto the feeded binding. The position on the binding is determined by the position of the lay edges.

The Easymark, or the latest version Präzimarck, is a computer-controlled foil stamping device, specially developed for printing varying titles, names or texts in foil. This machine is used by library bookbinders, for the varying titles on the spine and cover, and by the manufacturers of diaries, calendars and promotional gifts for personalizing the name on the end product.

Stamping occurs letter-by-letter using a heated letter roller, which contains between 90 and 200 characters, depending on the letter type and typeface. Titles and texts can be typed in or read in from disk. The information is then sent to the stamping device via the screen. For library work, it is possible to save the positioning of the different titles, making them easy to adapt. The production rate is roughly 40 to 50 different bindings, spine and cover titles per hour, printed at random. For the printing of varying names on diaries, over 200 copies per hour can be processed.

In semi-automatic gilding presses, the bindings are placed by hand against the lay edge on the retractable feed table. It is then transferred mechanically under the heated printing plates, where the bindings are stamped. The printing time is adjustable. The removal of the bindings from the drawn-out feed table also occurs manually. The foil spooling rate, the feed rate and the temperature and duration of the printing process are set in advance.

Publishing binderies generally work with fully automatic gilding presses. The bindings are fed into the press in a pile, where the undermost binding is pushed forward, placed on the press table and aligned between moving lay edges with the aid of mobile suction arms. Stamping then occurs, at very high pressure if necessary. The bindings are then gathered together again by the suction arms and conveyed out of the machine in staggered form or in small piles. The most widely used machine is the Kolbus PE gilding press. The latest version has a maximum working format of 660 x 405 mm and a printing plate of 420 x 355 mm. The maximum production rate is 80 bindings per minute. Such machines can also be positioned in line. It is then possible to execute two different prints for a single input and output process. The unrolling of the foil is set digitally. The two motors are both able to spool up to three different colors of foil at the same time. The extremely precise settings enable substantial savings in foil consumption to be made, since a small separation between the two prints can be achieved. Furthermore, the foil is not spooled if the machine makes a stroke

without a binding being present. Gilding presses are characterized by their sturdy construction and have a working life of many years.

Blind stamping and embossing

Before bindings were printed with gold or colored foil, the title or decoration was applied to the leather or parchment by means of blind stamping. Using heated letters or stamps required for the binding material, the image was then pressed into the binding with great force. A print was created as the result of this pressure and the scorching or discoloration of the material surface.

Now, blind stamping can also be applied as an independent printing technique instead of e.g. foil printing. Large blocks or titles, a line motif or an ornament look particularly good on linen. Many illustrated books and art books that are bound in linen, and have a colorful dust jacket, receive a blind stamp on the binding, so that the book is also recognizable without its jacket. The blind stamping technique can also be applied as a pre-treatment if certain areas of the raw linen need to be pressed smooth, to enable a fine text or small illustration to be printed on the material afterwards. This technique is recommended for a ribbed fabric like Regina or a coarser fabric such as Halflinnen Dark. Blind stamping is also necessary when an illustration, previously printed by offset on paper or a self-adhesive material, must be applied to the binding. In this instance, the blind stamp determines the positioning of the label to be applied 'at depth'.

In blind stamping the same stamps are needed as in foil printing. With regard to embossing, a patric and a matrix or a stamp and a counterpart are normally required. This presents no problem for blind or foil stamping on paper and thin cardboard. The same does not apply when bindings need to be stamped that will be glued around a book block by means of the end papers. In such cases, a relief print must not be visible on the inside of the book.

A coat of arms or medallion is embossed into a linen binding by means of a blind imprint stamp that has been etched or engraved at several depths. When the area surrounding the image is pressed flat, the image itself becomes raised. Surprising results can be achieved by working alternately with solid density and a line screen. In addition to blind stamping, embossing can also be carried out with gold and silver foil.

Common problems experienced in foil printing

The colored layer of the metal or colored foil does not bond to the linen or detaches at the slightest bending of the material.

Cause: temperature too low or insufficient compressive stress applied.

Solution: set the temperature correctly and apply a greater compressive stress, locally or universally. Increasing the printing time has no effect on a print when too little stress is applied. It is possible to partially compensate for a temperature that is too low by increasing the printing time. It is advisable to start at low temperatures, since heating occurs faster than cooling.

Contours not printed sharply; the gloss gold or silver foil becomes mat; a rainbow effect is visible on the print; the polyester carrier melts.

Cause: temperature too high.

Solution: Set the temperature correctly.

The print has not bonded sufficiently to the linen.

Cause: printing time too short or machine speed too high.

Insufficient heat transfer has occurred.

Solution: increase the printing time and input correctly or reduce the operating speed of the machine.

Certain pieces of the foil are missing in the print.

Cause: the foil spooling rate has not been set correctly, which means that due to the preceding print of the previous image on the foil, it is impossible to create a good print. The guide that determines the angle at which the foil is released from the stamp may also have been set incorrectly. It may be necessary to slow down the foil spooling rate, to allow the foil and linen substrate more time to cool, which will improve the adhesion.

Solution: Increase the space between two prints and set the guide at the correct angle, so that the foil comes free from the carrier more easily after stamping. It is important that the foil is released after stamping at the correct moment.

Uneven print of the stamp on the linen.

Cause: worn or damaged stamp; more compressive stress will only result in a thicker print.

Solution: replace the stamp or ensure that the substrate is adapted where necessary.

Using a soft substrate decreases the quality of the print. Small letters and fine ornamentation require a hard substrate. It is highly important that the bottom board on the printing plate has a hard and smooth surface.

Oily, blurred print of text or illustrations.

Cause: the duration of the pressure is too high.

Solution: set the embossing time correctly.

Obviously, the factors required for a good-quality print (temperature, duration and magnitude of the compressive stress) together with the linen substrate and the skill of the press gilder ensure the desired result.

Printing on linen by offset

Offset printing on cut-to-size sheets of linen seems more difficult than it is. A good-quality print can be made on binder's cloth, depending on the linen type. The surface of the linen must not be too rough and it is important that the sheets lie perfectly flat, so that feeding in, laying and transport through the press can occur without difficulty.

Why print on linen by offset?

By printing the linen in one color, the designer can allow the text and illustrations to run from the front cover, via the spine, through to the back cover. The usual interruption of the print in the grooves does not occur in this instance. It is certainly an economical solution for large print runs, particularly as this binding printing makes a dust jacket unnecessary. In terms of design and style, the binding must match perfectly with the printed content, which is also printed by offset. The designer can make the layout and the text and illustrations it contains run through to the end papers and the linen binder's cloth.

Reference works and high-quality textbooks are often bound in linen. The ordinary book on the shelf in the bookshop or in a catalogue should also offer this same style and recognizability to the reader. It must be visible on the binding, without the annoying jacket, whether the book is a medical reference or a work on biology. To make this clear, an appropriate full-color illustration must be printed on the book, in addition to the title and publisher's name. An illustration with a fine line screen cannot be produced in foil, and offset is therefore the solution. A multicolored pattern applied in different base colors if necessary can also be printed on the linen. Special departments of chain stores sell attractive note pads, writing blocks, appointments books, ring binders and folders in which such linen is applied. Linen can also be printed with a line motif that acts as a base. The designer can then differentiate titles in a series of publications by printing with varying colors on different colors of linen. After the binding has been made, foil printing can create a title frame in a solid color, after which the title can be printed, again by means of foil printing. In contrast to a printed paper binding, it is important in a printed linen binding that the linen is not printed over completely. The structure and basic color of the linen must remain largely visible. Linen is a very special covering material that is extremely strong, with unparalleled color strength. It should therefore remain possible to see and feel these qualities. Additional impact can be achieved by printing the screened background image in a color that works together with the colored linen to create a uniform whole. In this way, the unexcelled color strength of our linen is combined with the illustrations used. This can also be done using color gradients, which makes a substantial contribution to the exceptional quality and 'look' of the book. The printing ink penetrates the fabric without causing deformation, as is the case in foil printing. More and more designers are accepting the challenge of using this special binding material for books such as deluxe annual reports, memorial and anniversary books.

Linen can also be applied with a coating that is especially suitable for offset printing. This facilitates the offset printing process, but does cause the linen to lose some of its tactile structure.

This stiff linen is also applied in ring binders and other widely used end products. The enormous freedom allowed by offset printing also makes it possible to print 'sensitive colors', such as elements of company logos, on the binding, in the desired fashion.

However, the choice of colors for foil printing remains limited to the different types of foil that are suitable for application on linen.

Specifications for offset printing on linen

Upon request, we will cut the linen from the roll into sheets in the specified format. As a manufacturer, L. van Heek Textiles can do this for large print runs from extremely large production rolls, which means the linen lies flat after it has been cut into sheets. Other important factors are the insertion of sufficient sheets of cardboard and the secure binding of the pallet for dispatch or storage. In the production of lithographs, the dot enlargement that occurs when printing on linen must be taken into account. And when printing solid areas, the large ink application can cause a color deviation in comparison with printing on paper.

Screen 54 is the maximum attainable. The printer can apply normal ink types and allow these to dry naturally. To obtain the desired color strength, however, greater ink application is necessary than on paper, as the fabric absorbs the ink. If a vivid color is required for the title, it may be necessary to print the linen twice. The application of varnish in the press is possible, but this detracts from the natural texture of the linen.

Caution is advised when the covers of the book have heavily printed solid areas: these may transfer ink to unprinted areas when the books are packed on top of each other. If the printing on the grooves is too intensive, there is also a risk of staining, damage or the creation of shiny stripes when the groove is branded during the mechanized binding process.

Screen printing on linen

Screen printing is a process where the ink is forced through a stencil onto the material to be printed. The photographically produced stencil is applied to a fabric screen of silk, nylon or steel gauze, which is stretched tightly over a metal frame. The material to be printed – a piece of linen cut to size or the binding, is laid against the lay edges on the table, so that precision printing is possible when applying several colors. Ink is applied to the screen and spread over the stencil with a doctor blade, which forces the ink through the gauze. The screen ink runs onto the linen substrate during the printing process. Special ink is used for screen printing on linen, which has extremely good adhesive properties. The advantage of this technique is that the print can be applied to every surface. Exquisite results can be achieved. A disadvantage of screen printing is that the ink takes a long time to dry. Each binding or sheet of linen must be laid separately on drying racks, which requires a great deal of space and work. The inks used in screen printing have nothing in common with any other ink or dye that is applied in other branches of the graphics industry. Screen ink consists of certain pigments mixed with a binding agent, of which synthetic resin is the most important type. In screen printing, the relatively viscous ink is applied in a much thicker layer than in any other printing technique. Drying barely occurs through absorption by the printed material, but through evaporation of the thinning agents and solvents. Screen ink is available in mat and gloss varieties. The mat inks are delicate and have a drying time of about half an hour. Gloss inks are extremely strong and elastic, but have a drying time of three hours. By applying colorfast, pigment-rich inks, it is possible with screen printing to print light colors over dark colors, and good coverage can be achieved. This is not possible in most other printing techniques.

Screen printing allows the designer to choose any color without the restrictions that apply to colored foil. The designer can also opt to combine screen printing with colored or metal foil or blind stamping. Moreover, screen printing enables a localized base layer to be applied; whereas in offset printing, a fine-screen image must be produced. Screen ink is sufficiently colorfast and reasonably resistant to rubbing. Due to the thick layer of ink, the print lies on the linen. This is in contrast to offset printing, in which the ink penetrates the linen, leaving the fabric structure intact.

Screen printing is recommended when a drawing by hand or painted illustration must be printed. Due to the thick ink layer, manual application is approximated quite closely. The run-out of the ink during printing means that the screen technique has its limitations: fine-screen images are not possible and the procedure is not suitable for the reproduction of extremely delicate details. To achieve highly precise printing, the designer can opt to print the bindings after they have been made. The height differences, caused by the use of different board thicknesses for the front and back covers and the spine, can be evened out by the printer by adjusting the printing table.

The decision to apply foil, offset or screen printing is determined by the delicacy of the illustration or typefaces to be used, the number of colors, the size of the print run and the cost of the stamps. These factors must be weighed against the screen printer's preliminary costs. As a result of the numerous manual operations involved in screen printing and drying the prints, a relatively long production time is required.

Applying printed stickers to the binding

Fine-screen images cannot be printed directly onto linen. The option that is then frequently selected is the application of an illustration printed by offset onto self-adhesive paper. Such paper is generally machine-coated to make it self-adhesive. The bonding layer can be temporarily self-adhesive or permanently adhesive. This latter should be selected for a good adhesion to linen. To ensure that the sticker is placed in exactly the right position on the binding, it is necessary to make an advance print beforehand by means of reasonably heavy blind stamping. An additional advantage is that because the sticker is applied 'at depth', it will be less susceptible to damage during use. It is important that the sticker is not cut, but die-cut to halfway through the under layer. This facilitates the release of the sticker from the carrier and also guarantees the correct, square shape. The application of stickers is time-consuming and relatively expensive, as it is manual work.

Further applications of printed linen

For many years, specially manufactured linens suitable for printing have been used in the production of important documents, such as passports and driver's licenses. There are a multitude of other applications for linen that can be printed: special greeting cards, linen-laminated mount boards (applied with a border or print), luxury folders, covers for wallpaper and sample books, photograph and recipe albums, etc.

Laminating cardboard boxes with linen and other applications

Linen is also an excellent covering material for luxury packaging's. Many applications can be realized, thanks to the variety of structures and wide range of fashionable colors. Linen is supple and easy to work with, strong at the joint and, as described throughout this book, can be printed using the commonly applied techniques.

Foil printing in combination with full-color offset printing is a prime example of the surprising options available that allow designers to give free rein to their talent.

It is important to know that from a technical viewpoint, linen is a more suitable laminating material for cardboard than printed and laminated paper or glossy coated paper. Warm animal glue can be spread onto the linen for covering by hand or machine. The direct adhesive power of this glue is second to none, and it can also stick linen to linen. Rubbing the supple linen to be processed takes hardly any time. Linen that has been printed in advance with colored or metal foil can be processed without damaging or detaching the foil. This is due in part to the processing temperature (50 to 60°C) of the applied adhesive. At higher temperatures, the gloss finish of the foil is spoiled and the foil's adhesive layer may come loose. The financial benefit to the customer of laminating with linen can be as much as 25% in relation to the application of laminated paper. But in order to retain the luxurious look of linen, it must be applied under absolutely clean conditions. If, despite every care, the cardboard is contaminated by dust, this can easily be blown away with the aid of a high-pressure air jet.

Packaging

Linen is also eminently suitable for the manufacture of luxury carrier bags for products such as perfume, cosmetics etc. The printing can then be matched to the other packaging's.

Ring binders

Numerous loose-leaf systems are held together in a linen-covered ring binder. Naturally, these will often be editions aimed at environmental conservation and other environmentally friendly publications. But the publications on jurisprudence that you will find in lawyers' offices are also very often luxuriously covered in foil-printed or blind-stamped linen. Other applications include stamp and coin albums, extensive sample collections of paper and envelopes and ring binders for insurance companies and banks, using linen that has been produced in the company colors.

In ring binders intended for intensive use, which must look good, the special properties of linen – strong at the joint, extreme color strength and printability – are demonstrated to optimum advantage.