New series!

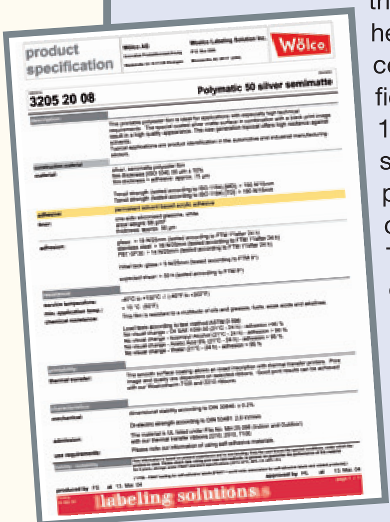
THE ABC OF LABELING

No two adhesives are alike

One of the most important requirements of a label is the safe adhesion on the product. Here the choice of the adhesive is important. The variety of adhesives is enormous and confusing at best. This editorial is to give you an insight into the world of adhesives.

History

The history of adhesives started thousands of years ago: Even in the ancient Egyptian society, gluing with tree resin, protein and animal glues was common. Until the middle of the 20th century, adhesives made of natural substances remained dominant. A significant change happened in the 1950s. New synthetic pressure-sensitive adhesives were developed in order to supplement the conventional natural materials. The requirements became more extreme: high adhesive forces, an economic price, constant availability with consistent quality, and high stability against weathering and environmental influences.


product specification

Wölco

3205 20 08

Polymatic 50 silver semimatte

labeling solutions

The high demand of the various industries led to modern processing technologies. The first pressure-sensitive adhesives were based on natural rubber. Later, this was increasingly replaced by synthetic rubber. The chemical industry developed synthetic adhesives, yet still based on organic solvents. An important progress was the development of emulsion adhesives. Water-based acrylic adhesives in combination with solvent-free silicones created many advantages: improvements in processing, increased durability – no hardening – and the replacement of the environmentally and health-hazardous solvents.

We differentiate between the following types of pressure-sensitive adhesive:

Rubber-based adhesives

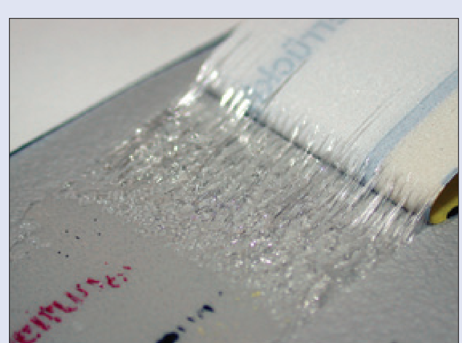
These adhesives are made out of synthetic or natural rubber and always contain synthetic resins. The durability and the UV light resistance are more limited than with acrylic adhesives, making this adhesive not suitable for outdoor applications. However, rubber based adhesives adhere better to untreated polypropylene and polyethylene surfaces, which are common in today's packaging industry. One of the most wide-spread adhesives based on rubber is the hot-melt adhesive.
Hot melt adhesives are solvent-free and have a solid content of 100 %. Prior to coating, the solid is melted under high heat and then pressed through a mold to form the adhesive layer. These adhesives adhere very well on moist surfaces and, thus, are suited to label products that tend to develop a condensation film due to temperature changes. The disadvantage of these adhesives is that they start to melt again if they are exposed to high temperatures once they have been applied.

Acrylic adhesive

Pure acrylic adhesives possess good and durable attributes. They are processed as dispersion or as a solution. The beginning and final adhesive strengths vary with the molecular structure. These adhesives are characterized by a high durability and weather resistance. The temperature resistance differs depending on the construction of the adhesive and the resistance against chemicals is high.

Modified acrylic adhesives contain additional additives which influence the quality of the adhesives and improve and optimize the adhesion for certain applications. For instance, adding selected resins can result in so-called softer adhesives, which can adhere even to low-energy or structured surfaces.

UV hot melt acrylic adhesives are relatively new to the market. These high-tech adhesives consist of solids like the hot melt adhesives. The UV acrylate is melted before it is applied to the label material, and after the coating process, the adhesive is cured under UV radiation. Using this technology increases the resistance to chemicals and heat, thus, combining the best qualities of the acrylic adhesives with the advantages of the rubber-based hot melt adhesives.



The self-adhesive label is removed from the substrate; traces of the adhesive remain visible.

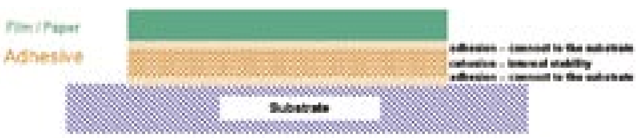
Series!

LABELING-ABC

A question of adhesion: permanent or removable?

In the last issue, the NEWS described various types of pressure sensitive adhesives and its main properties. This time, it explores the differences between those that are permanent or removable. To do this, it is necessary to first of all consider the definition of adhesives.

Definition of adhesive according to DIN 16920:
An adhesive is a non-metallic substance that can connect assembly parts by surface adhesion (adhesion) and internal stability (cohesion), without changing the structures of the parts.



Adhesion forces are attractive powers with limited range which always is affective on the boundary layers of solid materials. Therefore, the adhesive bond works between the adhesives' and the materials' surfaces. To maximize the strength of this bond, the adhesive must be able to adapt to the surface. The quality of the adhesion not only depends on the type of adhesive, but is also influenced by factors such as surface properties, the type of the substrate, temperature, and even the pressure applied during application. Typically, pressure sensitive adhesives are designed dynamically to reach their adhesion strength after a certain period of time. Cohesive force is the intermolecular force that functions within an adhesive and lends it its inner rigidity. This force is strongly affected by the chemical molecular weight, polarity, and the quantity/size of its filler groups.

As the definition describes, the adhesion and the cohesion form a type of interdependence within an adhesive. This means: changing the adhesion in one direction also changes the cohesion. For this reason, the adhesive manufactures provide a wide variety of adhesives with various properties. The spectrum ranges from the "easily removable" Post-It© notes to products designed for the "permanent" adhesion of labels for long-lasting product identification.

The permanent adhesion of labels requires a high adhesion. As a rule, the adhesive forces must be greater or at least as strong as the cohesive forces. In measurements of adhesion, a value of 8N/25mm (according to FINAT Test method 1) or more is desirable.

A low adhesion is sufficient for a removable bond. In this case, the cohesion is greater than the adhesion. Because of this distribution of the adhesive forces, a label can be removed from a surface without leaving any residue. An adhesion value of less than 4N/25 mm (according to FINAT Test method 1) is sufficient to meet this criteria.

Prepared for the future

Top Performance Confirms Excellence

Among the most important goals of Woelco AG is the instruction and advancement of the new generation of vocational students. For years, the first foundation was laid for the developing profession of label printers. Already at that time, Woelco designed the basic requirements for the job description together with instructors at the Johannes-Gutenberg-School in Stuttgart and the IHK. Since 2001, there has been an official label printer job description, and up to 20 students annually participate in the final exam that is divided into a theoretical and a practical section, to receive the vocational certificate. For the practical exam, the apprentices produce four-color labels in the company who trains them and additionally complete a color-mixing test.

In the summer of 2006, for the first time ever, a female participant received the award of being the best label printer. For Julia Roesch, it gave her a vocational certificate and a special distinction at the IHK. She completed the normally three year training in only two years and delivered an absolutely first-rate performance in the process. She finished with a cumulative grade of "A-" and is among the best apprentices of 2006. Woelco honored this achievement with an additional financial bonus. Uwe Dessecker, Management, congratulated and honored her on behalf of the executive board.

Series!

THE ABC OF LABELING

Film gives labels stability

The use of labels in the various technical industries places extremely high demands on their stability and durability. They are becoming more and more of a functional element in the production sequence and therefore an important component with high quality requirements. Due to its versatility, the film label is becoming increasingly established in these areas and can have considerable advantages over paper because of its specific properties. Film has a higher-quality appearance, does not wear as quickly as paper, and provides significantly more stability and resistance

Comparison of the effect of water

to the effects of the environment. It is also recyclable and can be used for transparent labels to achieve a “no label look.”

Whereas controversial PVC was the preferred packaging and labeling material in the 1980s, modern industry now relies on ecologically safer materials such as polyolefin film (PE/PP) and polyester film (PET), which are the choice for a wide variety of applications. The differences between the different film types vary depending on the chemical composition.

A distinction is made between the following types of film:

Soft PVC film

Unlike polymer film, monomer film is less durable. The reason is the migration of plasticizers, which occurs more easily in monomer film and makes the film turn brittle more quickly. With regard to printing and die-cutting characteristics, PVC film has advantages over PE/PP film, but the disadvantages of the toxic and corrosive properties of the material when it burns are an ecological disadvantage that cannot be ignored as environmental awareness increases.

Polyethylene film

Since polyethylene (PE) film has similar physical and mechanical properties as PVC film, it was the first product to replace it. This material is more resistant to chemicals and the weather than PVC film, and has better printing and die-cutting capability as well. It also requires a print-friendly top coat or corona treatment because of its non-polar surface. Before printing, it must be checked whether adequate surface tension is present or whether re-coating is required.

Polypropylene film

The alternative to PE film is polypropylene film (PP film), which has numerous additional advantages. PP film is stiffer and more transparent and is predestined for the expanding “no label look” market. However, this film material is not suitable for deforming applications because of its lack of flexibility. Another advantage of this material is its temperature resistance, which is slightly better than that of PVC and PE.

Polyester film

PET film is extremely suitable for technical applications because of its high temperature resistance. This type of film is dimensionally stable and retains its strength up to a temperature of + 150°C (302°F). PET film is generally easy to use for variable data printing and digital printing such as thermal transfer and laser printing. The smooth surface of the material makes it possible to apply precise quantities of ink as it has excellent printing quality and it is extremely resistant to solvents.

Material types	PET	PP	PE	PVC	Paper
Temperature range	-40°C to +150°C	-20°C to +90°C	-20°C to +80°C	-20°C to +80°C	-20°C to +70°C
Chemically resistant to:					
Alcohols Ethanol, isopropanol	+	+	+	0	–
Aromatic KW substances Toluene, Xylene	0	0	–	–	–
Grease / oil Engine oil, transmission fluid	+	0	+	0	–
Halogens Trichloroethanol	+	–	–	0	–
Ketones Acetone	+	+	+	0	–
Lyes Diluted caustic soda lye	0	+	+	+	–
Diluted acids Battery acid	+	+	0	0	–

\+ means high resistance 0 means acceptable resistance – means low resistance

Series!

THE ABC OF LABELING

The selection of the correct release liner

Each self-adhesive product inevitably needs a cover, in order not to adhere to something. The cover material is generally provided with an interlayer of silicone. Its function is to carry the actual label during the manufacturing process and protect its adhesive layer from contamination, so that it can proceed through processes such as printing, stamping, cutting, perforating, etc. The siliconized material serves as a stamping base when manufacturing the self-adhesive labels. Various release liner types or release papers are available as base material.

Release papers or release liner

Release papers with a wax coating were used until the beginning of the 60's, and were later replaced by silicone-coated release papers. Today, generally solvent-free silicone papers are used. This especially is a benefit for the environment but also for mechanical engineering, since solvent recovery as well as explosion protection are omitted.
The silicone paper works in the way that the surface composition on the paper results in an adhesive-repellent separation affect.
One of the release material choices is a plastic film, which is generally selected if the application has special requirements. Such a requirement may be a self-adhesive transparent label which must imitate the appearance of a direct print (known as the "no-label-look"). The smoothness of this film allows for a completely even adhesion application, which is reflected in the transparency of the entire label construction.
The effectiveness of these silicone papers is understood so that the surface composition on the paper results in an adhesive-repellent separation effect. The silicone surface on the release material is applied at a thickness between 0.8 and 1.2 g/sqm, which corresponds with an application thickness of approximately one micrometer.
Plastic film is generally selected as release material, if the later application has special requirements. For example, if a self-adhesive transparent label must imitate the appearance of a direct print (no label look), we recommend the use of foil as release material.
The smoothness of the foil achieves an absolutely even adhesive application, which is reflected in the transparency of the entire label structure.
The adhesive-repellent value (degree) is particularly determined. A rather light adhesive-repellent value has been successful in the past when dispensing labels automatically This is measured as the force that is required to remove the self-adhesive coated material from the release material.
This is also described as "release" in the label industry. This value is defined in test method No. 3 and the test procedure is described in the technical manual of FINAT.

FINAT test method No. 3 – Calculating the release values.
The factor of the separation response is mainly considered in the selection of the release material.
Important features for the separation protection papers are also the tear resistance, resistance during stamping, tensile strength, dimensional stability and transparency. All these factors must be coordinated with the requirements set by the processes and by the manual and automatic label dispensing. The release response can also be affected by the type of silicone coating and must therefore be adjusted to various applications.

Overview of various release types:

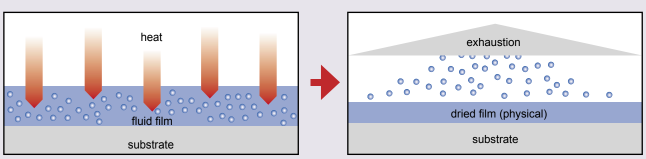
Glassine	Kraft	Film
Extremely compressed paper, therefore low thickness deviation	Porous paper	Plastic film (PET; PP; PE)
White, but also colored	White, but also colored	Transparent, but also colored
Processing from roll/roll	Processing from roll/roll and roll/sheet or sheet/sheet	Processing from roll/roll and roll/sheet or sheet/sheet
Thickness between 57 and 90 µm	Thickness between 80 and 170 µm	Thickness between 36 and 150 µm
Reacts to moisture	More stable than glassine against moisture	No effect to moisture
Attractive price, is used in more than 70 to 75% of applications	Excellent flatness	Extremely even adhesive application, is used for a „no-label look“

UV-curing ink systems for label printing

At Wölco, the origins of radiation hardening with ultraviolet light date back to the seventies. Rolf Wölfle, the founder of the company known as Wölco AG today, recognized the advantages of this drying method for label production early-on. One of the key benefits of using UV technology in production is that the printing ink has no chance to dry in the ink well, but hardens on the imprinted material in fractions of a second if UV light is applied. Other undisputed superior features are the excellent gloss and abrasion resistance it achieves in comparison to conventional printing ink. UV technology also offers health protecting benefits, given that UV printing ink usually does not contain any volatile solvents.

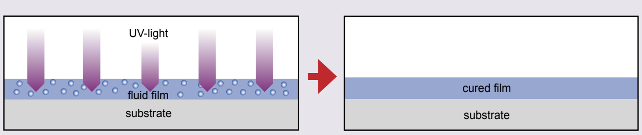
The process of using ultraviolet light for drying is defined as the hardening of a liquid substance (UV printing ink) under UV radiation. In printer jargon, the process is generally referred to as UV curing. To be able to better understand the UV curing process, it is critical to know the difference between the curing of conventional ink and UV cured substances:

Conventional – physical curing



In the conventional curing process, the printing ink is composed largely of pigments, resins and solvents. The solvent may be an oil that dries after a reaction to the oxygen in the air, which is the case with alkyd resin. It may also be a slightly volatile hydrocarbon such as petroleum. If water evaporates from latex paint the process is ultimately a physical curing process.

Chemical curing through UV radiation



In the chemical curing process, UV inks are converted to a solid state through a photo-chemistry process also called interlacing. This polymerization is triggered through the effects UV have on the UV printing ink.

To be able to fully understand the way this works and the properties of UV printing ink, one must take a closer look at the structure and reactive mechanisms of these UV curing materials. Simply put, UV printing ink consists of the components binding vehicles, pigments, photo initiators and additives. Two different methods of UV printing ink curing exist. The binding vehicle and the initiator used in the ink determine the interlacing method: radical or cationic

1. Radical reactive mechanism:

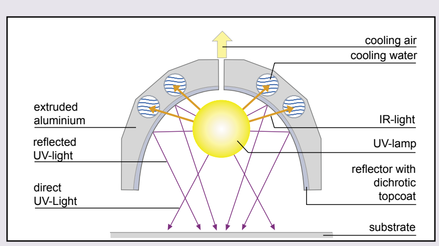
Acrylic substances in the form of monomers or pre-polymers (short-chain molecules) containing terminal double vehicles that interlace into long-chain polymers are used in the radical polymerization process. During this process, the binding vehicle assumes the functions of bonding, color transferability in the printing machine and pigment wetting. The most critical role to be handled by the binding vehicle is the generation of the hardened UV printing ink film. During the hardening reaction, short wave UV light divides the photo initiators into highly reactive radicals that react with other ingredients of the formula. Consequently, the photo initiators are one of the prerequisites for the creation of a cured film. The radicals react with the double vehicles of the binding vehicle composites. As a result, the vehicle itself becomes a generator of radicals and binds itself to other binding vehicle molecules. This process initiates a chain reaction during which over time more and more binding vehicle molecules combine into a three-dimensional network structure. This chemical reaction is called polymerization and occurs within fractions of a second.

2. Cationic reaction mechanism:

As a rule, the binding vehicle systems of cationic UV inks consist of cyclic epoxies. However, the photo initiators do not generate any radicals under UV radiation. Positively charged acids develop instead. These are called positive ions. When these positive ions attach themselves to binding vehicle molecules they transfer a positive charge, which is always further transferred. A chain reaction begins and a network is created. After it is complete, a hard UV printing ink film remains.

UV ink that cures through cationic reaction generally shrinks less than radically hardening UV systems. As a result, they have a strong impact on the adhesive properties on many polymer foils as they achieve better adhesion rates. Thanks to the critical post curing process the risk of migration and the development of odors of unhardened base materials is substantially reduced. Due to these properties, cationic process curing UV printing ink is frequently used in food-related applications.

An optimally performing UV system must be composed of numerous well coordinated components. To warrant the effective curing of UV printing ink Wölco uses highest quality UV drying equipment that is serviced continuously. The UV wave length range covers a spectrum of 200 nm – 400 nm. What we use is high energy short wave radiation in the realm between visible light and x-ray radiation. ■



Light fastness

Whenever a printer uses the term light fastness to describe a quality of the inks used, he or she is referring to the actual resistance of the print against discoloration or fading caused by UV radiation. Consequently the light fastness categories of printing ink, which is based on the wool scale, refers only to the ink's UV stability. However, very few people know how these light fastness levels are determined, what they mean and why some inks fade more quickly than others.

What is light fastness?

The term light fastness was standardized under DIN 16525 Testing of Prints and Print Inks in the Graphic Industry in 1965. On the one hand, the standard specifies the requirements for testing print products for light fastness. On the other hand, it also defines how light fastness is to be determined. Consequently, if one is talking about the print as such, the term light fastness refers to the resistance of the printed product against fading caused by UV radiation in the absence of a direct impact of other weather conditions, such as fluctuations in temperature or humidity levels. The light fastness of printing ink, on the other hand, is derived from the resistance a standard specimen produced with the ink pursuant to DIN 16519. However, light fastness is not to be confused with the volatility of printed products when exposed to weather conditions. After all, the duration of color fastness is of course contingent not only upon the amount of light radiation, but also upon other external conditions, which in turn have been defined in DIN 54071. As a result, light fastness is only one factor among several others that have to be considered in the production of your printed products.

Light fastness benchmarks and units

On printing ink products, you will find information about the light fastness of the product, which is listed in so-called light fastness levels. They indicate a certain level of stability of the full color when exposed to UV radiation. These light fastness levels consist of a scale of eight blue type colors on wool divided by their levels of light fastness. This is why the scale is also called the Wool Scale (WS). It is divided as follows:

1 = very low   3 = moderate   5 = good   7 = supreme

2 = low   4 = reasonable   6 = excellent   8 = outstanding

However, this information does not only provide a vague idea as to how long a printed product may be exposed to the sun before its colors begin to fade. In fact, for each of these levels, it has also been determined how many days or weeks of day light radiation they are equivalent to, which is also depends on the season and the location, where the printed product will be exposed to the sun. The following figures will give you an overview:

light fastness	summer	winter
step 3	4 – 8 days	2 – 4 weeks
step 4	2 – 3 weeks	2 – 3 months
step 5	3 – 5 weeks	4 – 5 months
step 6	6 – 8 weeks	5 – 6 months
step 7	3 – 4 months	7 – 9 months
step 8	über 1,5 years	

Which factors determine the light fastness of a product?

These timeframes are determined by several print ink factors. A pigment that can be exposed to sunlight continuously without being affected simply does not exist. Triggered by chemical processes, the only factors that can counter act the quick decomposition of the color are the composition, concentration and state of the pigment. The binding agent also plays a role. It decomposes slowly but surely due to the impact of the UV radiation; as does the pigment consistency. To those looking at the print, the decomposition is evident in the fact that the color has faded. Magenta and yellow are more easily affected by these changes than cyan and black. Consequently, the former two colors are expensive to produce in high light fastness levels and cost buyers quite a bit more. The production of high light fastness hues of the latter two colors is considerably less complex.

Light fastness factors

Moreover, the light fastness levels indicated always refer to the full tone of the color. Consequently, any blending of colors, especially brightening using white, always leads to a drop in light fastness levels. In addition to these factors, which determine the light fastness, it is also important to take the quality of the imprinted materials into account, since they absorb ink. Yellowed paper does of course have an adverse effect on even the most beautiful blue. The method used to apply the ink also plays an important role. After all, in practical uses the ink application stipulated in the standard does not always occur. Compared to full tone applications, the thickness of the ink layer is frequently reduced due to half toning. As a result, the ink is diluted and it is easier for UV rays to attack it. Varnish coating or film lamination can frequently prevent these problems, because it sets highlights and – in some cases - can increase the UV resistance of the ink considerably.

Light fastness

Wölco produces printed products using the flexo printing process and inks that comply with the following light fastness levels:

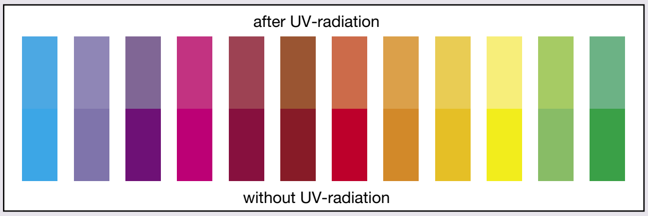
Magenta and yellow = 6 excellent

→ 6-8 weeks of direct exposure to sunlight possible during the summer months

Cyan and black = 8 outstanding

→ more than 1.5 years of direct exposure to sun possible

If your printed product is also film laminated or enhanced with UV resistant varnish coating, you would be safe to assume that it will retain its brilliant colors even after one to two years – despite the high quality ink colors used.



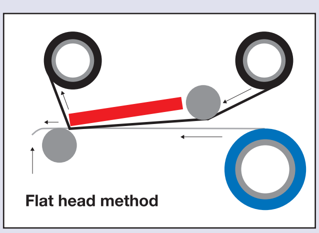
Thermal Transfer Printing System

Thermal transfer printing established itself as a leading process for flexible identification and labeling applications in manufacturing, retail and logistics back in the mid 1980s. This printing technology is being used in fax machines, in cashier systems, in the printing of plastic cards, tickets, vouchers and even postage printing systems. Faster printing systems that offer ever higher resolutions have been advancing the thermal transfer solution and make it an ideal solution for ever more applications. Color cartridges were developed simultaneously that boast higher sensitivity levels that make them more flexible and fulfill the ever more exacting standards of printing image permanence. On the one hand, users can now use just a few highly flexible color cartridge qualities for a wide range of applications on numerous printers and labeling materials.

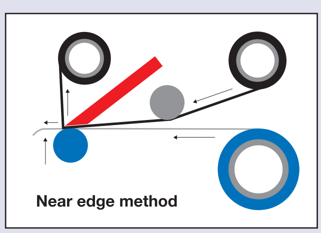
The various printing principles

Flat head method

A transfer film is pressed together with the labeling material on the heating panel (red). The roller beneath the heating panel generates the required counter pressure and transports the material, which is driven by an electric motor. The heating panel, which is usually made out of a ceramic material and has cast heat points, burns paint particles into the labeling material from the film at temperatures of >80°C. The used transfer film is spooled back onto a roll, which is driven by a motor. The spooled film is consumed and no longer useable. The label now bears the generated printed image.



Flat head method



Near edge method

Near edge method

Contrary to the flat head printing head, the near edge printing head is positioned at an angle of 20 - 30° to the substrate and the printing head is near the edge (NEAR EDGE).

Thermal direct method

All thermal transfer printers also offer thermal direct printing as an alternative option. When using this method, no film is required. Instead, a temperature sensitive labeling material is used. Printers specifically designed for the thermal direct method are also available. These do not have the required mechanical spooling mechanics for transfer film and can therefore not be used for both methods.

The most important element of the thermal transfer printing solution is the thermal print head, which contains a large number of individual heating points in a single row, which are called dots. The higher the resolution, the more expensive the heating panels and thus the printers will be. Resolutions of 200, 300 or 600 dpi are available as industrial standards. The higher the resolution, the better the depiction of graphics. At 200dpi, printers will have 8 heating elements (pixels) per mm and at 600 dpi 24 pixels per mm. The color medium is the so-called thermal transfer cartridge (TTC). It is actually comparable in some ways to the ribbons of a typewriter, with the exception that a thermal transfer printer does not apply the ink mechanically, but thermally. As the individual dots on the thermal print head are heated up, the ink is melted on the TTC and sticks to the label. While the thermal print head does not move, the label material and the thermal transfer cartridge simultaneously pass by under the thermal print head, which applies a certain amount of pressure to the thermal transfer film.

Principally, one distinguishes between three qualities of transfer film:

The **wax quality** has little scratch and smear resistance and is suitable only for inferior applications, such as price labels and short used labels. One of the typical characteristics of wax qualities is that they are usually only suitable for paper. They also produce acceptable wiping resistance and clear imprints on turned barcodes. They are suitable for all applications that call for good printing quality that has to last only a short time, for instance address and shipping labels. Consequently, they are very popular with supermarkets and retail stores.

Thanks to its medium scratch and smear resistance, the wax/resin quality is suitable for most applications and usually delivers good printing quality on most materials. Typically, the wax/resin quality is suitable for use on paper, coated materials and film. It produces good wiping resistance and clear imprints of turned barcodes. It also boasts heat resistance of up to 100°C. It is perfect for all applications that call for good printing qualities and medium term durability, e.g. for product identification, price labels and light, water and heat resistant labels.

Because of its high scratch and smear resistance, the resin quality is used in combination with film for sophisticated labels that have to meet exacting standards, however, it is – as a rule – only compatible with plastic labels. Among the characteristics of the film: It is compatible with coated papers and film, e.g. PET, PP and PE. They have outstanding wiping and scratch resistance as well as first rate solvent resistance. They are also heat resistant up to 180°C. They are best for all applications that call for high levels of printing quality and extremely high friction resistance, e.g. rating and type labels, labels for chemical products as well as those exposed to very high temperatures. All cartridge qualities are available in a variety of colors, such as yellow, blue, green, red or orange. If other colors are required, they can be made to order, however, these processes are usually based on large volume minimum orders. As a rule, thermal transfer film is not available at budget prices, but it does meet extremely high standards and usually handles all of these expectations without any problems.

Color sample - Woelcotherm ribbons

THE ABC OF LABELING

Print quality in thermal transfer printing

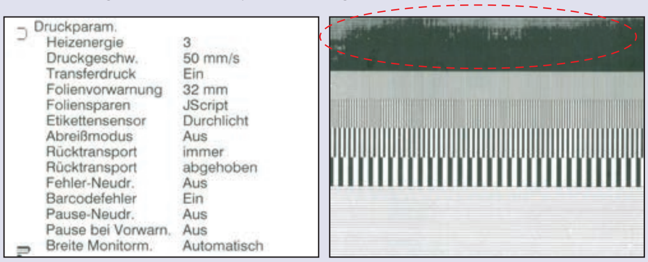
In the last edition of the Wölco News, we informed you about the theoretical basis of thermal transfer printing. We also outlined the possible application of the three different color ribbon qualities. Today we would like to embark deeper into the subject of print quality in thermal transfer printing.

For sophisticated applications and extreme environments, thermal transfer printing represents the optimal solution. This method creates long-lasting labels with a high-quality print image that tolerate many physical and chemical stresses. In general, an optimal print result is achieved in therma l transfer printing when the printing system, label material and color ribbon are precisely coordinated. With the actual print system other factors are crucial for the print quality, namely the selected thermal transfer printer model, the printing speed, the heat of the print head and the print image to be created.

The print speed and choice of heat at the print head are primarily responsible for a good print image in the printing process. The following figures illustrate the impact these two parameters have on the print result. All the important elements such as font, lines and surfaces are contained in the print image itself.

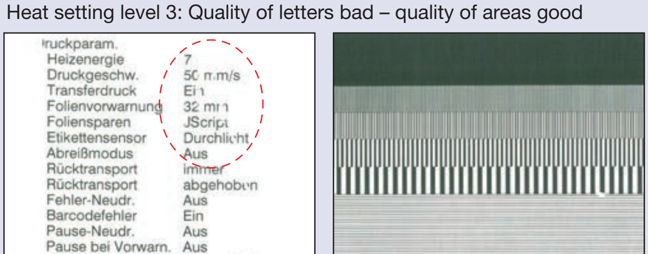
A: Parameter – heat setting with constant print speed 50mm/sec.

Heat setting level 3: Quality of letters good – quality of areas bad

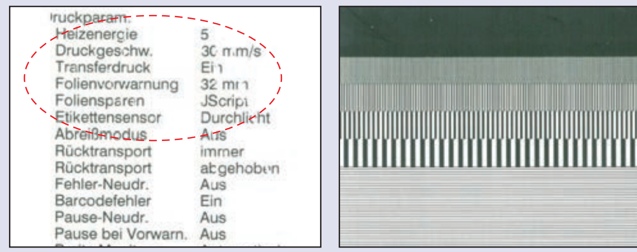


Heat setting level 5: Quality of letters good – quality of areas good

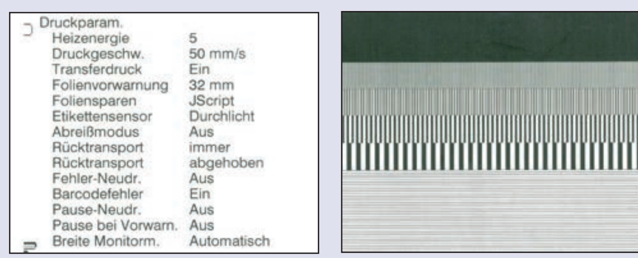
Heat setting level 3: Quality of letters bad – quality of areas good



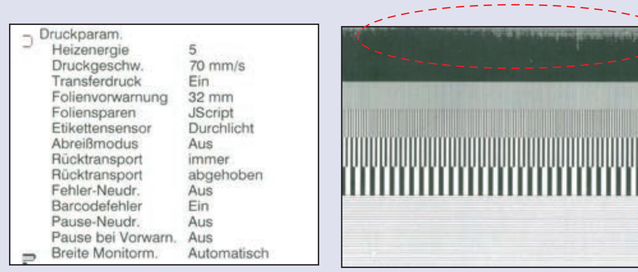
B: Parameter – print speed with constant heat setting level 5



print speed 30mm/sec. :
Quality of letters bad – quality of areas good



print speed 50mm/sec. :
Quality of letters good – quality of areas good



print speed 70mm/sec. :
Quality of letters good – quality of areas bad

Lessons learned:

Changing the heat setting while maintaining a constant print speed has a lasting impact on the print result. The same is true for maintaining a constant heat setting and changing the printing speed. Basically, one cannot assume that high heat setting will create a good print image. The difficulty lies in the creation of clean fine lines/fonts as well as clean full areal forms in this printing process.

We always recommend performing a print test with the printer model and materials used, such as the adhesive material and the corresponding thermal transfer color ribbon. Wölco specialists would be pleased to assist you in the selection of appropriate material combinations.

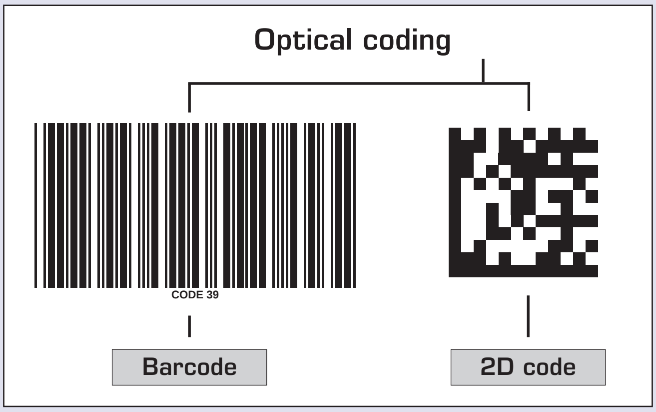
Barcode / 2D Code Technology

Basic principle and operation

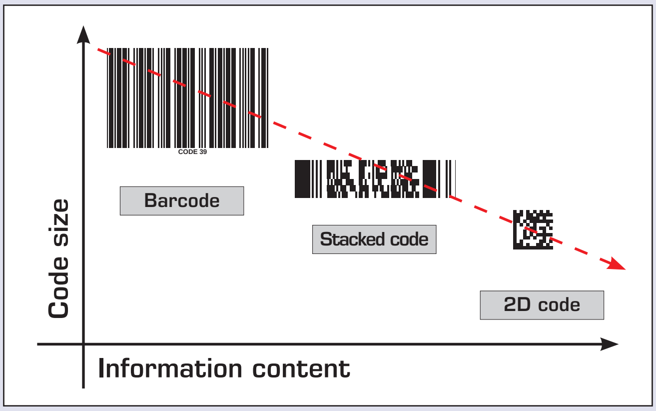
A barcode is an optically readable code that allows machines to quickly scan, capture and read printed data. It consists of parallel bars of varying widths, i.e. lines and spaces. Here, the meaning of “code” does not come from “encode.“ Instead, it refers to the representation of data as binary symbols. Barcodes have existed since 1949, but those most common today were developed in the 1970s. They include types such as EAN/UPC, Code 39, Code 2/5 interleaved and Codabar.

A barcode system consists of three basic components:

- a barcode or 2D code applied to an object (product) to be identified
- a barcode scanner (reader) or a 2D code imager (2D code scanner or imager)
- the unit transmitting communication to a computer



Alongside these, the technical requirements for a number of other codes were developed. These are called 2D codes (two-dimensional codes) and are a further development of 1D linear barcodes. The term “2D code“ derives from its two-dimensional representation of data. This differes from 1D codes, which provide data only one-dimensionally on the X-axis. There also is a distinction between stacked codes (stacked barcodes) and matrix codes. The latter’s development began in the late 1980s, and the best-known matrix codes are PDF417, DataMatrix, MaxiCode, QR code and Aztec code.



The main difference between linear barcodes and 2D codes is that the barcode itself contains no information, just a reference to data such as an item number. Therefore, it only makes sense in the context of a database. On the other hand, 2D codes contain actual information.

Barcodes and **2D codes** are usually applied to labels with a barcode printer. However, they can also be applied to packaging or products with an inkjet printer or printed along with the packaging. The code to be used depends on many factors. These include the quantity of data, space requirements, orientation, the product to be identified, the scanner distance and much more. Codes must therefore be evaluated for each application. Ultimately, this is dictated by the industry or the user.

Barcode scanners and **2D code imagers** scan or read many types of bar or matrix codes. Scanning is always optical. Beams sent by a light source are reflected differently by the bars and surfaces. The scanner records the reflections and decodes them for evaluation. With laser scanners or CCD cameras, the code can be captured from a given distance, either while moving or standing still.

Communication transfer to a computer takes place through standardized interfaces. The data can be transferred through cables, infrared connections, WLAN (Wireless Local Area Network), GSM/GPRS and/or Bluetooth. Mobile data capture systems can communicate in both directions over wireless systems.