PRINTING OF JAC FILMS IN OFFSET

JAC offers a diversity of self-adhesive films for the production of labels and stickers for outdoor use.

Flexible PVC films constitute the most important product group. They have proved themselves throughout many years of practical application and cover the widest range of applications. They are available with the "built-in" peel-off aid JAC-SPLIT®, which is also featured on the PVC-free alternative JAC-ECOPLUS®. JAC-SPLIT® saves you the additional trouble of having to provide your labels or stickers with die-cut peel-off tabs.

However, filmic materials like EcoPlus, Serilux Plus etc. have one thing in common: they are non-absorbent. This is a property which is altogether unusual in offset printing; normal absorption of the printing ink is not possible. It is therefore necessary to ensure that the inks to be used and the conditions in which they are to be processed are carefully adapted to each other!
Materials with a matt surface may perform best in terms of ink acceptance and keying.

Printing inks

Offset printing inks comprise not only colour pigments, reducers, fillers and siccatives but also binding agents, such as mineral and vegetable oils, which exercise a decisive influence on their drying properties.

Drying

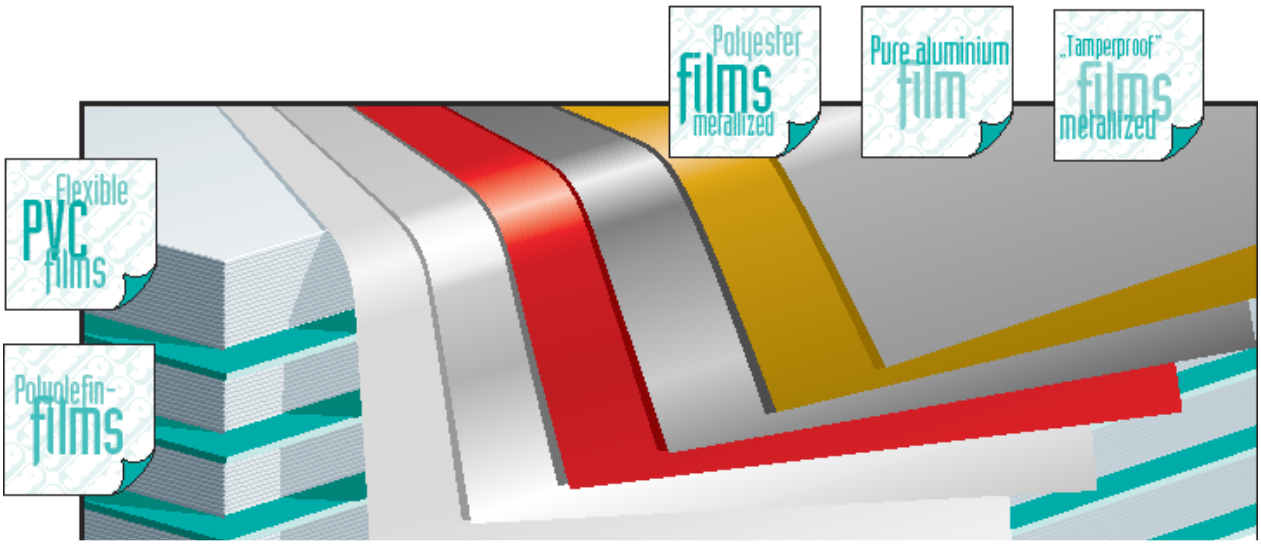
When they come into contact with the oxygen in the air, vegetable oils form a viscoplastic film which keys the printing ink to the print carrier. This process takes place only very slowly, requiring up to 12 hours, but it can be accelerated through the addition of siccatives. Such drying processes are referred to as chemical or oxidation drying processes.

Mineral oils, on the other hand, separate themselves from the other components of the printing ink and are absorbed by the print carrier. This is a relatively fast process, beginning as soon as the ink is transferred to the print carrier, whereby the coating of ink quickly develops the necessary "toughness" for the next printing operation or for delivery.

This drying process, which is based on absorption, is a physical process. Absorbent printing stock, i.e. almost all types of printing paper, can be printed with inks featuring such combinations of chemical and physical drying properties. Non-absorbent printing stock, that is to say materials which do not consist of fibrous and/or porous substances, such as self-adhesive metal foils and plastic films, for example, will reject the ink-keying components of normal offset printing inks with the result that the ink will not dry.

Special-purpose printing inks

The solution to the problem is to use special-purpose inks which are not only accepted by the film or foil but also feature components which are chemically compatible with all other materials used in conjunction with them, i.e. primers, paints, varnishes and, naturally, printing inks. Such special-purpose inks have been available to the printing industry for many years and are usually recognizable by their names or designations, e.g. "...plast" or "CMYK foil/film", or by such supplementary information as "for plastics", "for non-absorbent printing stock" or "for the printing of films". Such inks dry mainly or exclusively through oxidation and are referred to as "oxidation drying inks".



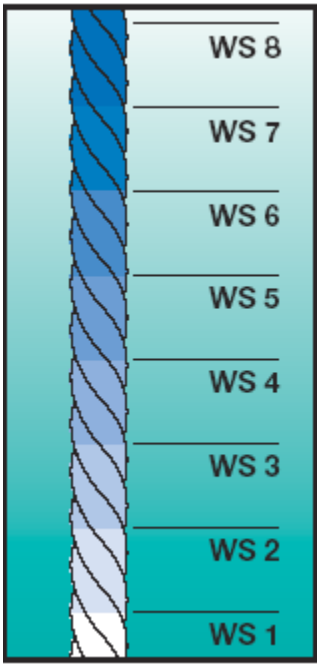
Plasticizer resistance

These special-purpose printing inks must also be adequately resistant to plasticizers in cases where plasticized materials, e.g. self-adhesive flexible PVC films, are to be printed. If this is not the case, the drying process may be impeded from the outset, or if the ink does dry, then it may soften after a few days or weeks in consequence of a subsequent chemical reaction between the ink and the film. Ink manufacturers always recommend extensive trials prior to use.

Light fastness

Light fastness is ascertained by comparing printed specimens with the so-called "blue wool scale" in long-term colour fading tests. According to this scale, there are eight degrees of light fastness:

- WS 8 = outstanding
- WS 7 = excellent
- WS 6 = very good
- WS 5 = good
- WS 4 = fair
- WS 3 = moderate
- WS 2 = poor
- WS 1 = very low



The light fastness of film inks formulated to "Euro Scale" shades is between WS 5 and WS 8. Some manufacturers offer extremely light-fast alternatives with WS values that are not below 7 or 8. The WS values can be expressed in terms of weeks and months:

Light fastness

	Summer	Winter
WS 5	3-5 weeks	4-5 months
WS 6	6-8 weeks	5-6 months
WS 7	3-4 months	7-9 months
WS 8	over 18 months	over 18 months

It must be remembered, however, that the above values may serve only as a rough guide, for they refer to the light fastness of a standard specimen printed in line, not halftone, and there are a great many factors which the light fastness test does not take into account: mixing with other inks to produce a different or lighter shade, reduced thickness of ink layer, halftone printing, conditions prevailing where the product is to be used.

Drying properties, plasticizer resistance and light fastness are always indicated in the technical descriptions of the printing inks. Further information can be obtained directly from the printing ink manufacturers, who will also be prepared to print samples of the material which you intend to process.

Printing machines

A prerequisite for the printing of non-absorbent printing stock by a conventional wet offset process is the ability to control the flow of the fountain solution with extreme accuracy in order to ensure an optimum ink/water balance.

This is possible only on offset printing machines equipped with separate inking and damping units. Hydrocolor units equipped with combined inking and damping systems which cannot be used separately are unsuitable.

Likewise unsuitable are small offset printing machines of the kind used by instant printing and photocopying services.

Possible printing methods

Basically you can choose between the following possible printing methods:

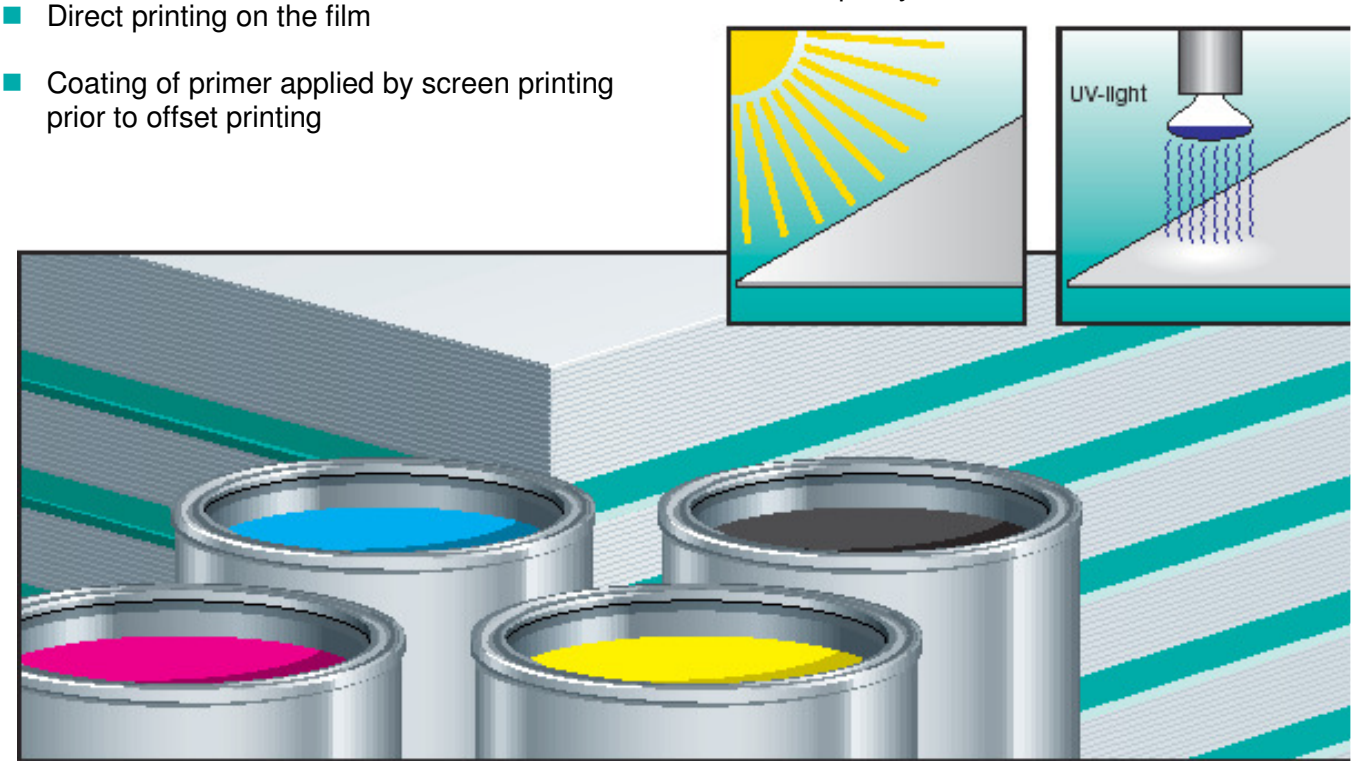
- Direct printing on the film
- Coating of primer applied by screen printing prior to offset printing
- Subsequent coating of protective varnish applied by either UV offset, screen printing or varnishing machine
- Subsequent lamination with clear film

A screen-printed coating of primer renders the film absorbent.

Subsequent varnishing or laminating not only enhances the appearance of the print but also improves abrasion and scuff resistance, UV stability and weather resistance in general.

The most common method is to print directly on the film and then to apply a protective coating of varnish, whereby offset printing is used for both operations.

The actual choice of method will depend on the printer's own experience, the type of films to be printed, the type of inks and additives used, the desired quality and, last but not least, the costs.



Processing conditions

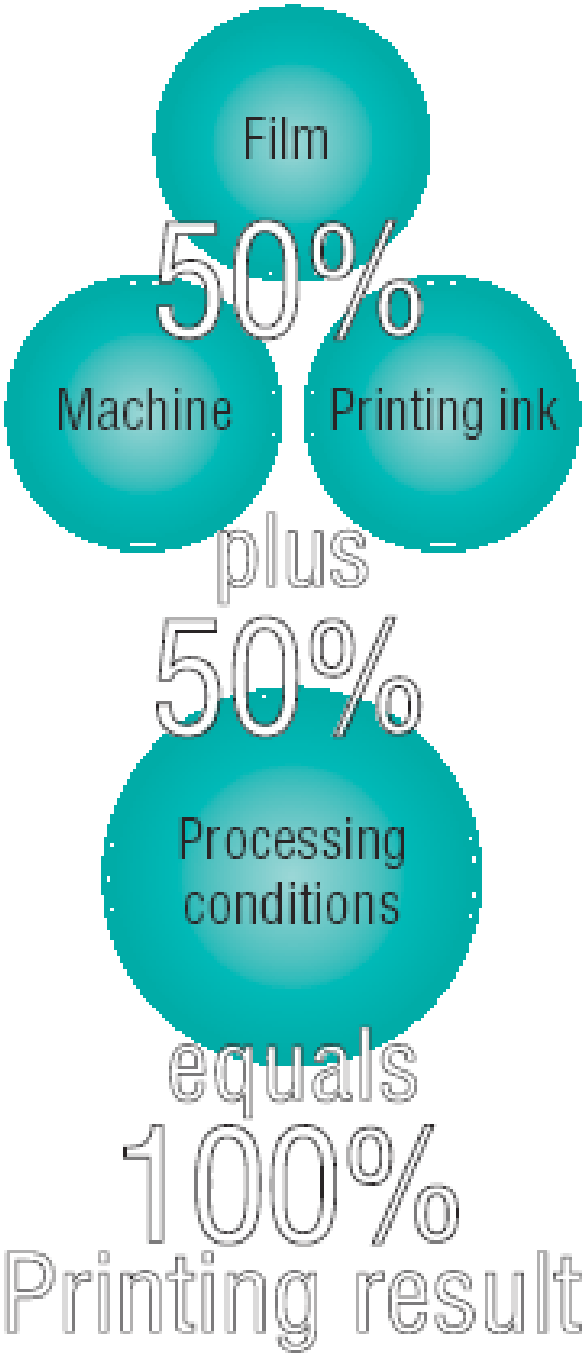
Whilst an optimum choice of print carrier and printing ink may have been made, the processing conditions still constitute an additional factor which is equally decisive for the final result. In other words:

Suitable machine, film and printing ink 50 %
+ optimum processing conditions 50 %
= good printing results 100 %

Besides carefully heeding the printing ink manufacturer's instructions, always ensure that the following conditions prevail:
Ideal climatic conditions for the printing shop: temperature approx. 20 °C, relative humidity approx. 55 %.
Prior to printing, allow the film adequate time to adapt to the temperature prevailing in the printing shop, thus preventing the possible formation of moisture (condensation) on the surface of the film, as this would adversely affect ink keying and drying. This is particularly important during winter months when sheets which have been stored in cold rooms are then transferred to a much warmer room for processing.

- Avoid cold and damp conditions in the printing shop.
- Carry out trials beforehand.
- If you are processing films and inks with which you are not familiar, you are advised to check them for compatibility (a "dab test" will tell you whether the ink will key or not).

If you are handling such a printing job for the very first time, it will be worthwhile doing a small print-run under actual working conditions. This will enable you not only to check the drying and keying properties of the ink but also to provide your customers with finished products as samples of the obtainable quality.



PRINTING OF JAC FILMS IN OFFSET

Printing inks

Printing inks used for the printing of self-adhesive films dry very quickly - through oxidation – and relatively long machine downtimes should if possible be avoided in order to prevent the ink from drying on the printing rollers and in the ink duct.

Delivery problems can be avoided by reducing the thickness of the ink layer to a minimum.

Adequate transfer of fresh ink from the ink duct to the printing rollers is necessary for ensuring optimum drying behaviour. A small image or a small format processed on a large-format machine will cause an excessive absorption of moisture by the printing ink. This in turn will adversely affect the drying of the ink. In such cases, provision should be made for additional ink taking surfaces.

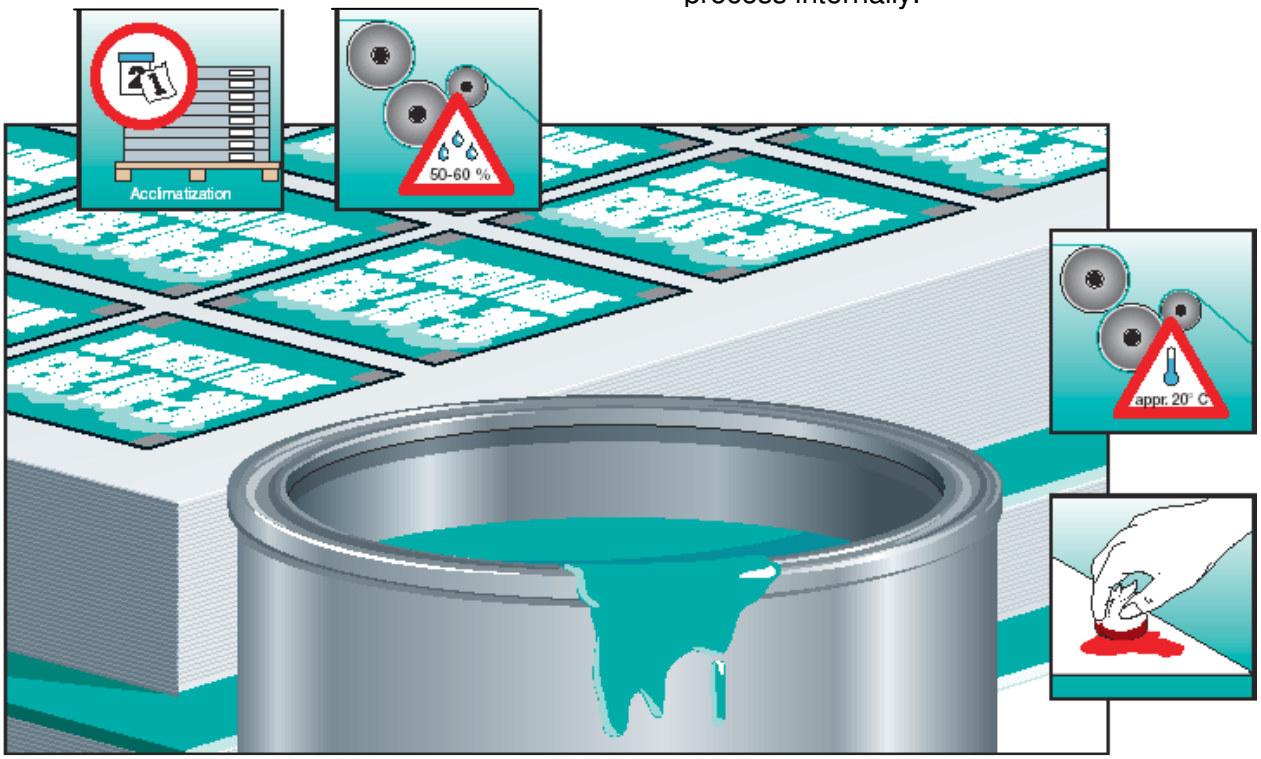
Multicolour printing

Single-colour offset presses: the intervals between the individual passes through the machine should be as short as possible in order to ensure that the subsequently applied layers of ink will take properly, i.e. will not be repelled by the layers already printed.

Processing on multicolour machines is always preferable.

Printing ink additives

The drying, keying and abrasion-resisting properties of printing inks can be improved by means of certain additives. The addition of siccatives also hardens the ink layer, thus improving its mechanical resistance. The same goes for reducing agents. Untested or additional components might even produce the opposite effect. Unwanted retardation of the drying process through an excess of fountain solution can be counteracted by a chemically reactive siccative which improves the drying process internally.



Fountain solution

Since the films do not absorb any moisture, and the drying, keying and abrasion-resisting properties of the ink are adversely affected by even the slightest excess of water, it is absolutely essential to keep the flow of fountain solution to a very minimum.
A method that has proved particularly advantageous is to add approximately 15% isopropyl alcohol to the fountain solution. This permits absolutely minimum damping whilst accelerating evaporation.

pH value just over 5

Drying can also be improved by adding a siccative to the fountain solution. Such additives should not be used, however, unless they have been properly tried out beforehand or have been recommended by the printing ink manufacturer.

Delivery

On account of the very slow drying process (oxidation), it may take up to three hours before the ink is completely smear-free. This means taking extreme care during delivery. The sheet delivery unit must be optimally set for the smooth guidance and absolutely flat and level delivery of the sheets.

- Keep pile heights to a minimum, e.g. 200 sheets, not more than 500 if possible.
- Do not use spacer wedges.
- After initial surface drying, repeatedly air the prints to assist the drying process.

A light application of anti-set-off spray will almost always be necessary. Choose a fine grain size and avoid using the spray excessively, as this will adversely affect the abrasion-resistant properties of the ink.

Remember: always be on the safe side by carrying out trial prints or doing a small print-run when you are printing on films for the first time or are working with inks and/or films with which you are not familiar.

Special offset printing processes

The processes described below are particularly suitable for the printing of non-absorbent printing stock. Their most important features and advantages in comparison to the conventional wet offset process are briefly as follows:

Waterless offset printing

Higher colour brilliance and greater dot sharpness. The process waives the need for damping, hence fewer problems with the drying of the ink on non-absorbent printing stock.

Besides using special inks and printing plates, the waterless offset process necessitates investment in an ink or inking unit cooling system in order to ensure a consistent quality of print.

UV offset printing

The ink is cured by UV radiation in only fractions of a second prior to delivery, hence no downstream drying and delivery problems.

Higher chemical and mechanical resistance of the ink layer; good light fastness; good adhesion to non-absorbent printing stock; excellent results when used in conjunction with protective coatings of clear varnish; the ideal process for the printing of self-adhesive stickers.
Necessary investments include a UV curing system, special roller coverings, rubber blankets and, last but not least, UV curing inks.

How well self-adhesive film stickers can nowadays be printed in offset – and here the conventional wet offset process is no exception – is evidenced by the market every single day.
So go ahead and print your own excellent stickers with JAC films – without any need to invest in additional equipment – simply on your existing machines!

Guarantee and liability **May 2016**