INX COATINGS & ADHESIVES

TECHNICAL RESOURCE INFORMATION

Waterbased Coatings

Strike-Thru Effect OPV v25.1

Printers are continually seeking new ways of offering their customers unique and innovative coating techniques. These techniques can help to enhance brand image and attract consumers to products with exciting and exotic packaging designs. In many cases, exploration into new and unique coating techniques requires an investment in new equipment technology and substantial resources dedicated to the interest of 'R&D' to perfect the process. For Printers who do not have the capabilities or resources to explore more complex coating techniques, one proven application that continues to be very popular and adds enhancement to a printed piece is the use of a Strike-Thru Over-Print Varnish (OPV) to create a visual gloss-matte contrast effect when paired with a compatible gloss coating product.

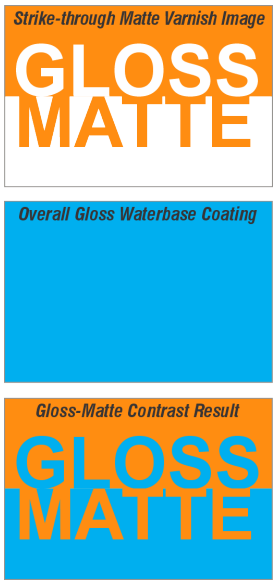
Waterbased Coating – Strike-Thru Effect OPV Technique

Advantages

- Traditionally, to achieve a gloss-matte contrast effect, the use of individual gloss and matte litho varnishes would be applied to the sheet in spot applications with their respective images – this process would create the following difficulties:
  - Registration issues – trouble differentiating between the two varnish plates when making adjustments which can result in a visual mis-registration once the varnishes dry.
  - Extended drying times can be a problem as both varnishes must be completely dried prior to printing the second-side or moving to finishing processes.
  - Additional/dry-trap pass due to the lack of available printing units.
  - Chemical/'gas-ghosting' which can cause visible quality defects and ruin the job.
  - Varnish set-off, blocking, scratching/scuffing, excessive spray powder use and poor rub protection.
- Use of a strike-thru varnish/gloss waterbased coating combination can eliminate many of the above-mentioned problems:
  - Using an overall/flood application of a gloss waterbased coating means registration of one varnish plate to the ink/print graphics.
  - Waterbased coating dries quickly providing short-term protection of varnish and underlying ink layers for quicker turn-around times for second side printing or finishing processes.
  - Waterbased coating provides improved protection of sheets in the delivery pile preventing set-off, blocking, scratching/scuffing.
  - Waterbased coating allows for reduced spray powder application.
  - Waterbased coating provides excellent rub protection through finishing processes and on finished pieces.

Application/ Technique

- Strike-thru effect varnishes (OPVs) are specially formulated conventional/oxidizing lithographic over-print varnishes that can be used in conjunction with a compatible gloss waterbased coating product to create a visual/measurable gloss-matte contrast effect on a printed piece:
  - The strike-thru varnish is applied to the printed sheet using a printing unit and litho plate that carries the desired spot matte image.
  - After the matte varnish image has been applied to the printed sheet via the printing unit, an in-line flood/overall area of gloss waterbased coating is applied using a coating blanket/plate by the coating unit.
  - The extended interaction/'migration' between the semi-wet strike-thru varnish film and semi-dry gloss waterbased coating film results in the coating film becoming 'matte' in appearance in the varnish areas – surrounding areas of coating which does not contain the strike-thru varnish will remain glossy, creating an apparent visual contrast between the areas with/without the varnish applied.
  - A measurable gloss contrast of 30-40 gloss units measured using a 60° gloss meter is typical when using a high-gloss waterbased coating and strike-thru effect varnish.



Requirements

- The strike-thru varnish contrast technique is a relatively simple and repeatable process – most Printers who are properly equipped can perform this effect and achieve good results without issue during their first attempt.
- The following is required for producing this technique:
  - Press with an available printing unit for strike-thru effect varnish application via litho process.
  - Litho plate with desired strike-thru varnish matte image for application via printing unit.
  - In-line coating unit with coating blanket/plate material for application of a gloss waterbased coating that is compatible with strike-thru varnish to achieve the desired contrast result – both anilox and non-anilox/roller-nip application systems are suitable for this technique.
  - Press drying system equipped with IR (infrared emiiters), HAK (hot-air knife) and Air-extraction for proper drying of printing inks, strike-thru varnish and waterbased coating – spray powder unit is recommended.
  - Consult your INXCAC Technical Sales Representative about varnish/coating product recommendations for use with the strike-thru technique.

Waterbased Coating – Strike-Thru Effect OPV Considerations/Best Practices

Considerations

Process Considerations

- Strike-thru varnish is intended to have a waterbased coating applied as a protective topcoat – strike-thru varnish is NOT intended for use without a topcoat waterbased coating being applied as the varnish alone does have suitable rub protection.
- Strike-thru varnish is a conventional/oxidizing varnish:
  - Varnish film will dry slowly over time and will not be immediately dry/hard despite the waterbased coating providing initial protection – strike-thru varnish will dry oxidatively like any other conventional OPV.
  - Strike-thru varnish contains oxidative drying oils which can yellow as the printed piece ages – this is like all other oxidative/conventional OPVs.

Contrast Considerations

- The degree of gloss-matte contrast can be affected by several factors including:
  - Beneath ink-layers – amount of ink density/coverage, ink/fount emulsion stability and drying rate of the inks.
  - Fountain solution parameters, particularly wetting agent concentration.
  - Residual fountain solution contained in the beneath ink-layers and strike-thru varnish film.
  - Substrate/paper type, surface smoothness and relative hold-out/absorbency.
  - Respective amounts of strike-through varnish and gloss waterbased coating that are being applied.
- For optimum contrast results, a thicker strike-thru varnish film and thinner coating film is most effective – use caution not to over-emulsify the varnish film by pushing varnish quantity and relative fountain solution quantity.
- An anilox volume of 8-10 bcm in recommended – this provides a thin enough coating film to allow for a reasonable/stable amount of varnish to be applied to optimize low-gloss results in the varnish areas while still preserving a high-gloss result in the non-varnish/coating-only areas of the sheet.
- Contrast will continue to develop as the strike-thru varnish film dries over time – the immediate 'off-press' contrast result is normally less than what will be achieved over several hours and up to 24 hours after printing.
- The job graphics content/image area will contribute to the visual contrast – using strike-thru over dark color ink/image areas will provide the highest degree of visual contrast.
- If the job graphics/image areas contain only light-coverage/light-color ink areas or ink-free/paper-only areas, the contrast will be less apparent than image areas that contain heavy-coverage/dark-color ink areas – the job graphics/images will contribute to the contrast result, not all job images/graphics are suitable for or will benefit from the strike-thru technique.
- A lower viscosity waterbased coating can improve the gloss-matte contrast rate and overall visual/measurable contrast result – lower viscosity coating can make the migration process for the varnish more efficient.
- Strike-thru varnish/waterbased coating applied in-line over cured UV inks can provide the best contrast results.

Equipment/Material Considerations

- Strike-thru varnish is a conventional varnish and is not compatible with EPDM roller compounds used in UV printing/press applications – EPDM roller manufacturer/supplier should be consulted prior to use to determine possible negative effects.
- Strike-thru varnishes contain flattening agents that can cause litho plate wear the same as other matte or dull OPVs – consult with your plate manufacturer or supplier to determine the best plate selection for this application.

- The use of plate materials manufactured to withstand wear for long press run lengths is recommended.
- Avoid using plate materials that are debris sensitive and prone to wearing easily.
- Printing presses equipped with ink fountain liners can suffer from wear of the liner between the ink fountain roller and fountain zone metering cylinder – this should be monitored to avoid excessive fountain liner wear resulting in varnish leakage and contamination of the ink fountain zone assemblies and ink fountain motors.

Drying Time

- The strike-thru process generally requires more allocated drying time prior to additional processes/finishing compared to a 'typical' job with waterbased coating applied due to:
  - Strike-through varnish is a conventional/oxidizing varnish and requires oxidative-drying to fully cure/harden.
  - The strike-thru effect is a migration-process that requires aging after printing/coating to produce the full contrast result – this is a progressive contrast process that takes time for the final result to be realized.
  - The strike-thru process typically uses a high-gloss waterbased coating over-printing the ink/varnish areas – this can slow the overall drying process of the printed/coated sheet due to:
    - High-gloss waterbased coatings can be inherently slower setting/drying for improved film flow-out/ leveling to create the smoothest film possible to optimize specular reflectance and visual/measurable gloss.
    - A waterbased coating over-printing the ink/varnish films creates a layer of reduced permeability for oxygen which slows the oxidation process of the beneath conventional ink/varnish layers – this can cause extended drying-times for the beneath ink/varnish films.
  - Additional factors such as running an excessive varnish film or maintaining a poor strike-thru varnish/ fountain solution emulsion stability/balance can result in the need for extended drying times prior to second side printing or finishing processes.
  - It would be advised to develop a SOP for use with strike-thru jobs as it relates to drying-time allocation after printing/coating and prior to finishing processes to ensure that the printed sheets are suitable for handling/ machining to prevent quality-defects.

Waterbased Coating – Strike-Thru Effect OPV Testing

Press Testing

Evaluating Contrast Potential & Relative Press Settings

- As the strike-thru effect is a migration process and requires time to fully develop the 'dullness' in the varnish areas, it may be necessary to conduct testing for the Operator/s to understand how much varnish is required to achieve the desired contrast effect.
- With most modern coating systems being equipped with anilox applicators, the amount of coating applied during the process is relatively 'fixed' with the varnish amount and relative fountain solution being the primary variables.
- Additional variables such as inks, ink coverage/TAC, ink/fountain solution emulsion stability, substrate type, substrate surface quality/hold-out, and drying system capability/operation are also variables that should be accounted for in testing.

Graduated Ink Fountain Testing

- Used or determining:
  - Contrast potential for varnish/coating along with all other materials/consumables.
  - Optimum operational press settings using a 'graduated ink-fountain' technique.
  - Determining the proper varnish amount needed to achieve the desired contrast under controlled conditions for materials/consumables.

Procedure

1) Using an even ink-coverage test form, begin by setting the ink fountain in the center ink zones at a strike-thru varnish amount that you believe will be necessary based on the varnish image area/coverage – this should be a typical setting used for an OPV.
2) Set the ink-zones to one-side of the fountain progressively lower for varnish film thickness and the opposite-side for progressively higher varnish film thickness to create a 'range' of varnish application across the sheet.
   - This allows for the observation/comparison of a single printed/coated sheet with a variation in the varnish amount across the sheet to determine the ideal amount, and avoids the need for making repeated adjustments to the varnish quantity and multiple press runs to create comparative sheets.

- Fountain solution quantity should be considered when setting a graduated ink fountain to account for the variation in varnish film-thickness across the sheet – care should be taken not to over-emulsify the light/thin varnish-film areas. This may require running the heavy/thick varnish-film areas slightly 'dry' with slight scumming/smearing.

3) Once the graduated ink-fountain is set and dampening speeds are determined to be minimum, run a minimum of 500 consecutive sheets at the desired production speed to ensure that the varnish/dampening balance/stability is consistent/optimum, and the drying-system operation is sufficient/stable.
4) Immediately remove a sheet from the press delivery as the 'off-press' reference sheet and mark/flag this area of the press-load as a 'sample area' for removing additional sample sheets for testing – this will ensure all samples that are tested/evaluated were produced under the same print/press conditions.
   - When evaluating 'aged' sheets, it is important that these sheets have remained captive in the press-load as the drying conditions for the varnish/coating films will be different compared to a sheet that has been left 'open' and exposed – premature drying of the varnish/coating films can 'stall' the migration process and yield a lower contrast result compared to a captive sheet in the load.
   - Additional sample sheets for testing aged conditions should be removed from the press-load at the time of the desired contrast testing intervals. Avoid using a sheet that has been left open from the time of printing such as a pull-sheet left on the press-console/table sheet. Do not judge the top sheets of a pile/stack for contrast, only use captive sheets further down in the pile/stack.
5) Immediately after pulling the 'off-press' reference sheet, conduct and record gloss measurements using a calibrated 60° gloss meter across the sheet (OS to GS) in the varnish and non-varnish/coating-only areas to determine the relative 'off-press' gloss results – record these gloss values across the sheet to correspond with the ink fountain zones and relative varnish amount.
6) After one hour, remove an additional sheet from the marked sample area of the press-load and measure the same areas as the initial off-press reference sheet and record the gloss results – do not use the same initial 'off-press' sheet to re-measure/evaluate for aged gloss results, always pull a new sheet from the captive sample area of the press-load.
7) After 24 hours, remove an additional sheet from the marked sample area of the press-load and remeasure the same areas as the initial off-press reference sheet and record the gloss results. These results will provide a correlation between 'off-press' gloss measurements and 'aged' measurements at one-hour and 24-hours off-press. With these results, it can be determined the proper amount of varnish to be run to achieve the desired aged contrast results.

- This technique provides the Operator/s an off-press correlation/guideline for gloss measurement in varnish areas to reference during printing.
- If strike-through is run across a range of substrate-types such a different papers/paperboard with different surface qualities/hold-out potential, it is recommended to conduct testing on each substrate type to gauge the contrast potential and relative press settings.
- If changes have been made to the applied coat-weight such as an anilox/volume change, it is recommended to conduct testing to determine the new/updated contrast potential and relative press settings as it relates to the change in applied coat-weight.