

### Digital Coating – Fujifilm J Press Coating Application Considerations

#### Scope

- For use with:
  - Fujifilm J Press 720S/750S/750HS models
  - P26 and HS ink types
- Jpress inks (P26 & HS) are unique and have proven to require specialty coating, capable coating equipment, and specialized methods/processes to create predictable and reliable results for coating performance as it relates to adhesion to the beneath ink layers and block resistance when coated prints are in a pile.
- Discuss with your INXCAC Technical Sales Representative about your specific J Press coating needs:
  - Not all coatings are suitable for use with J Press prints – INXCAC has developed specialized Waterbased and Energy-Cured coating products for use exclusively with J Press prints.
  - Not all ‘coaters’ are capable/equipped for use with J Press prints – coaters can consist of:
    - Dedicated ‘offline’ stand-alone coaters (TEC Lighting, Kompac, Harris Bruno, etc.)
    - Offset presses being used to apply coating in off-line scenario.
  - Specific methods/processes need to be followed to achieve satisfactory coating performance with J Press prints – successful results are as much process related as coating product related.
- Testing is paramount in verifying the compatibility of all aspects of the coating process – successful coating results are contingent on ‘Coating + Equipment + Process’
- This document is intended as a general guideline for best practices when using INXCAC J Press formulated coatings over J Press prints.

#### J Press Print Aging

- Fujifilm J Press uses waterbased inks that require the allocation of off-press drying time prior to any coating application – considerations that can impact the drying rate and condition of waterbased inks:
  - Substrate selection – substrate holdout/absorbency
  - J Press drying system settings
  - Ink saturation/TAC
  - Ambient conditions – temperature/relative-humidity
  - Allocated drying time
- Premature application of coating to J Press prints with insufficient drying time can result in the following:
  - Poor/negative adhesion of the coating film to the underlying ink layers – results in scratch-off and tape-lift of the coating from the J Press ink layers
  - Picking/sticking/blocking of coated sheets in a stack/pile – in both single and two-sided applications
  - Absorption of the applied coating film into the underlying ink-layers causing visual/measurable ‘gloss-back’ and visual ‘de-wetting’ of the ink film in the appearance of a color-shift or density loss – this can be dependent on the ink coverage/saturation and substrate

#### Offline Coating – P26/HS

- Fujifilm recommends that J Press prints (P26/HS inks) age/dry for a minimum of 24-hours prior to any ‘offline’ coating application:
  - Experience has proven that off-press aging of J Press prints CAN be reduced prior to coating, however, testing should be conducted to confirm the actual results as many variables exist that can contribute to a negative outcome – testing should encompass all actual job/process variables for validation.

#### Inline Coating - HS

- ‘Inline’/immediate coating of HS inks has proven successful using both Waterbased and Energy-Cured coating formulations – this requires a capable coating system approved for use by Fujifilm with J Press 750HS using HS inks.
- P26 inks have proven unreliable for inline coating

## Sheet/Ink Temperature

- Heat has proven to be a critical component of the coating application process to promote positive adhesion for Waterbased and Energy-Cured coatings to underlying J Press ink layers – both P26 and HS inks.
- Infrared (IR) capabilities are a necessary component of the drying/curing systems of the designated coating equipment to achieve a sheet/ink temperature that will ensure that there is a positive adhesion result between the coating film and underlying ink layers:
  - **Waterbased Coatings** – IR will be used in conjunction with HAK (hot-air knives) to provide adequate coating drying while achieving positive adhesion results.
  - **Energy-Cured Coatings** – IR exposure will occur after coating application and prior to exposure to the UV lamp/s.

### Coater Equipment Considerations

- Coater Equipment that is not recommended for use with J Press prints:
  - Absence of any IR capabilities
  - Defective or deficient IR bulbs, lack of IR redundancy
  - Insufficient IR/heat exposure after coating application – unable to achieve recommended sheet/ink temperature targets:
    - Can result in poor/negative adhesion to beneath J Press ink layers contributing to scratch, tape-lift and abrasion/rub resistance failures – this is with use of either Waterbased or Energy-Cured coating products over J Press prints using both P26 and HS ink types.

### Recommended Sheet/Ink Temperature Correlation – Offline

- Long-term testing of Waterbased and Energy-Cured coatings applied offline over J Press prints (P26/HS) across a broad-range of coater types/equipment has provided consistent results for coating adhesion based on the below correlated sheet temperature references – temperature is measured using a handheld pyrometer as sheets enter the delivery-pile/stack of the coater machine.
- Below sheet/ink temperature recommendations can be used as a general guideline – testing should be conducted to correlate the actual temperature/adhesion results with respect to the specific coater equipment and relative drying/curing capabilities:

Ink Areas - Coverage	Sheet/Ink Temperature
Paper-Only/Ink-free	>110F
Light/Moderate Ink Areas	>120F
Heavy/Saturated Ink Areas	>130F

- To achieve the necessary sheet/ink temperature to promote positive adhesion, it may be necessary to operate the IR at a high/maximum output and/or reduce coater machine speed to increase sheet dwell/exposure to the IR system:
  - The IR bulbs/system should be cleaned and free of any paper dust, spray powder or other debris/contaminates to ensure there are no safety/fire hazard issues as the IR output for use with applying coating over J Press prints may be much higher than what is typically used in other applications on the coater equipment.
  - Follow IR system Manufacturer’s recommendations/procedures for cleaning and maintenance intervals.
- It may be necessary during each coater/machine start-up to place a ‘book’ of waste sheets on top of the ‘live job’ J Press prints to allow the desired sheet/ink temperature to be achieved – this prevents the first ‘live job’ sheets from experiencing coating adhesion issues due to lack of start-up temperature.
- If using an offset press as the coater, operate the drying/IR system in a ‘manual mode’ to ensure that all sheets are exposed to the same temperature conditions – operating in an ‘automatic mode’ can result in temperature fluctuations throughout the J Press job contributing to variances in coating adhesion performance.
- Excessive heat exposure can have a negative effect on the substrate, inks, coatings and equipment – a minimum sheet/ink temperature should be determined to produce a predictable/reliable coating adhesion result without creating excessive/unnecessary temperature that may have a negative consequence.
- If the coater equipment is not equipped with IR capabilities, is in poor or defective condition, or is not capable of achieving the above measured sheet/ink temperature recommendations, the coater is not suitable for use with coatings and J Press prints.
- Consistent achievable sheet/ink temperature is paramount in successfully coating J Press prints.

## IR Placement – Energy-Cured Coating

- For use with Energy-Cured coatings – on coater equipment that allows the placement/relocation of the IR bulbs/module relative to the UV lamp, it is recommended to position the IR before the UV curing unit as close to the UV lamp as possible.
- Keeping the sheet/ink temperature as high as possible as the sheet enters the UV lamp for film cure has proven most effective for gaining positive Energy-Cured coating adhesion to J Press inks.

## Two-Sided Coating Applications

- Due to the unusually high sheet/ink temperature to achieve positive adhesion results for coating applications, the resulting captive pile temperature can be much higher than normal and will require time to allow the relative pile temperature to reduce prior to applying coating to the second side.
- As a general-rule, allow the pile temperature to reduce to <80F prior to coating the second side – this should be determined by measuring the center of the sheet using a handheld pyrometer several inches down in the pile:
  - When using an offset press as the coater for J press prints, the use of spray powder can be of benefit by creating space between sheets in the pile for ventilation and heat dissipation.
  - On coaters where spray powder is not available, the captive temperature of the pile may take much longer to dissipate, and the relative temperature may be retained for a longer period.
  - Ventilating the pile by manually ‘winding’ the sheets can help liberate the temperature from the pile – use caution to ensure the sheets can be handled at that point without creating any quality-issues/defects.

## Digital Coating – Fujifilm J Press Coating Qualitative Testing

### Coating Adhesion Testing

- General adhesion testing can be conducted on Waterbased and Energy-Cured coatings applied to J Press prints using the following methods – allow coated sheets to age/cool after coating application for >10 minutes prior to testing:

#### Tape-Pull/Lift – 3M 600/810 tapes (600 – Red Package, 810 – Green Package)

1. Apply tape strip to coating film using even/moderate pressure and allow to rest for 5 seconds.
2. Lift the tape from the coating film with even/moderate force/speed – pulling the tape back over itself.
3. Inspect the tape and J Press print for any coating film lift from the beneath ink-layers:
  - Failure – coating film lift from the underlying ink layers, ink layers remain intact on the substrate
  - Pass – coating film does not lift from underlying ink layers and remains intact OR coating/ink lift off the substrate causing the paper coating to split (inspecting adhesive side of tape should show white spots where paper coating has split and lifted along with coating/ink)

#### Scratch/Nickel

1. Using a US nickel (or similar smooth edge coin) with a smooth/undamaged edge, wipe the edge of the nickel across the coating film surface with even/moderate pressure.
  2. Inspect the coating film surface for defects:
    - Failure – any scratch/fracture/removal of the coating film from the beneath ink layers (when using satin/matte coatings, burnishing of the coating film is not considered a failure)
    - Pass – coating film remains intact and is not removed from the ink surface
- If adhesion testing fails, increase the sheet/ink temperature by incrementally increasing the IR output AND/OR decreasing coater machine speed to increase dwell/exposure.
  - Repeat testing until successful adhesion results are achieved across the sheet.