TECHNICAL C&A INFORMATION

COATINGS & ADHESIVES CORPORATION

Glitter UV Coating - Sheetfed

Glitter UV coating products can be used to bring an exciting and exotic appearance to a printing piece with a wide variety of glitter colors, shapes and sizes being available. While some glitter applications can be achieved without the use of specialized equipment, the use of larger particle sizes that may attract more attention can be a more specialized technique that requires proper planning, application equipment/materials and experience to make it an achievable and repeatable process.

Application Considerations

Design/Layout	Placement of a glitter coating on a printed piece should be taken into consideration when areas that will include scoring, folding or cutting will be involved. Smaller glitter particles, <25 microns, will typically not be problematic in these areas, however, much larger particle sizes, >50 microns, can create issues for cracking and adhesion along areas for scoring, folding or cutting.
Adhesion	Testing the adhesion properties of the glitter coating over inks, primer coating and substrate should be conducted prior to production. When applying a glitter coating in a spot-application in a separate pass over a flood UV coating film, care should be taken as not to cause the paper to become dry and brittle, the ink film to shrink or the ink to soften due to the repeated heat exposure in the UV curing process. In each scenario, adhesion issues can result.
Paper	Care should be used in paper selection to minimize paper cracking during the printing and finishing processes. Heavy basis-weight papers are most desirable to maintain the integrity of the paper and prevent distortion/curl/embossing that can be caused when using glitter UV coatings. Distortion/curl can be related to the glitter image graphics and the grain direction of the paper.

Process Materials

Glitter Options	Glitter particles are available in a wide-range of colors, shapes and sizes. Colors vary widely and include single and multiple-color options as well as switch/interference pigments which will color-shift depending on the viewing angle of the printed piece. Shapes are typically square or hexagonal, however, larger particles can be produced in a variety of custom shapes. Particle sizes can be uniform or supplied in a range to provide a variety of pigment sizes in the applied coating film. Smaller pigments sizes, 5-25 microns, will produce a 'shimmer' effect as the particles are too small to be individually observed by eye and are suitable for achieving a pearlescent appearance. Larger particle sizes, >50 microns, will result in a glitter effect in which the individual particles can be observed by eye.
UV Coating Product	Glitter UV coating products are specialized formulations that enable a thicker than normal coating film to be applied, depending on the glitter particle size, while maintaining good characteristics for film cure-response, flexibility and adhesion. Glitter coatings are generally much higher in viscosity compared to general-use UV coating products due to the need for higher volume anilox rolls to enable transfer of the glitter particles; this is determined by the size of the glitter particle being used. Glitter particulate may be added during coating manufacturing, or supplied as a separate dry material to be added to the base coating immediately prior to use. Glitter particles are available in various sizes, colors and shapes depending on the press equipment capabilities and desired visual effect.

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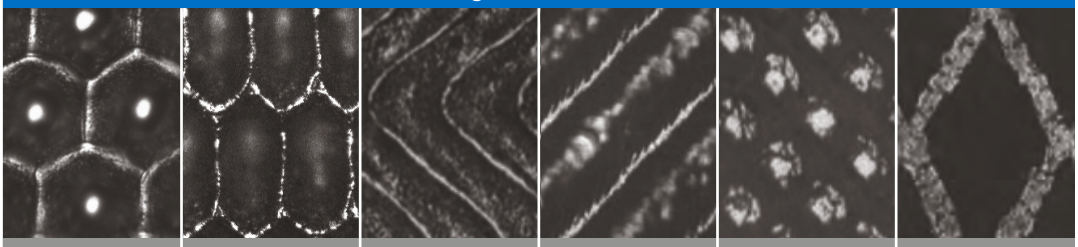
Process Materials - *continued*

Anilox Engraving Selection

Depending on the size of the glitter particles, an anilox with a much higher volume may be required compared to a general-use UV coating product. While a general-use UV coating product may use an anilox volume of 12-14 bcm, a large glitter UV coating can require an anilox volume of >40 bcm to achieve desired results. In this case, a special "open-cell" engraving pattern such as Tri-helical, or Reverse-Engraving may be required to create a roll with the necessary volume/bcm and release/transfer characteristics to achieve the desired results, while avoiding the issues of chamber-foaming that can occur with a "closed-cell" engraving. In cases where extremely large glitter particles are desired, a diamond engraving can be employed to control the coating application rate to avoid over-application or spitting/slinging while ensuring glitter transfer.

Glitter UV Coating - Anilox Recommendations



	Hexagonal	Elongated Hex	Channel-Wave	Tri-helical	ART(Pins-up)	Diamond
Cell Stucture	Closed	Closed	Open	Open	Open	Closed
Engraving Angle	60°	75°	n/a	45° / 60°	45° / 60°	45° / 60°
Volume Range, BCM	14 - 20	14 - 20	14 - 20	14 - 50	20 - 60	40 - 85
LPI	140 - 180	140 - 180	140 - 180	75 - 140	60 - 140	40 - 100
Glitter Particle Size	< 50 µm	< 50 µm	< 50 µm	25 - 100 µm	50 - 100 µm	80 - 200 µm

Anilox Engraving/ Coating Viscosity Correlation

The use of a high volume anilox roll for glitter UV coating application creates a very "open" engraving, which mean that the roll does not contain the necessary wall structure to hold a low viscosity coating in the cell. If the coating viscosity is too low relative to the anilox cell structure, the coating will flow out of the anilox cells resulting in slinging, spitting, containment blade reverse-doctoring and excessive coating application to the coating plate. The excessive application rate to the coating plate can result in beading along the image edges, loss of image detail and excessive glitter transfer. Comparatively, if the coating viscosity is too high compared to the anilox volume/cell structure, the transfer efficiency can become reduced and the application rate to the coating plate can become insufficient to achieve a desired glitter effect. Due to these potential problems caused by low/high viscosity, it is necessary to match the coating viscosity to the anilox roll engraving to ensure that the coating meters correctly and proper release/ transfer to the coating plate is achieved.

Chamber System Metering-Blade Selection

It is important that the anilox roll surface is metered completely clean prior to transfer to the coating plate to avoid spitting/slinging, containment blade reverse-doctoring and excessive coating transfer that may result in poor image quality and beading. Due to the abrasive nature of glitter UV coating products, it is necessary to ensure that the doctor-blade material being used in the metering position is a wear resistant material. This may include using ceramic coated steel blades, low COF reinforced composite blade materials or specialty coated metal materials. In addition, the tip profile of the metering blade should be sufficient to promote wear resistance while maintaining the necessary metering capabilities to suite the graphics. When using glitter UV coating products, if fine/detailed graphics are avoided, a round blade profile is the most suitable choice for extending blade life. The use of a ceramic coated steel blade material will provide the most longevity for blade wear.

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Process Materials - *continued*

Chamber System Containment-Blade Selection	Un-like the metering blade position, the containment blade position requires a very flexible blade that can flex/bend and allow any residual coating on the surface of the anilox walls to pass through and re-enter the chamber opening. If the containment blade is too rigid, any coating on the roll surface will become reverse-doctored and build on the containment blade surface, while any glitter material can promote blade wear. A flexible polyester blade material is most suitable for this position.
Coating Plate Material	Typically, glitter UV coatings are applied to create coarse to moderately-fine detailed images which may require an analog or digitally imaged polymer relief coating plate or cad-cut strippable coating blanket/plate. Coating plates that provide a very smooth and hard surface for coating transfer from the anilox roll to the substrate may experience transfer deficiencies as the glitter particle may become vacuum-locked to the coating plate surface. In this case, for proper coating transfer from the plate surface to the substrate, the coating plate surface may require a refined surface to ensure that coating material remains between the glitter particle and plate surface during transfer to facilitate release. A refined surface or shallow screen image on the coating plate surface may be required if transfer problems are encountered. In order to ensure proper and repeatable fit for precise spot applications, performing a print-length/distortion test is advised by the plate material supplier to account for any print-length variance that is inherent in the coating process using a relief plate. When performing a distortion test, it is important to confirm and document all materials and settings including: coating relief plate/thickness, under-lay material/thickness and coating plate tension/torque. Always measure and confirm the actual material thickness and document for reference. It is important that the coating plate is imaged with support bars or "bearer bars" to support the anilox and substrate and control both application and impression contact pressures. These support bars run circumferentially within the paper margin but outside of the job image area to provide continuous contact of the anilox to the coating plate in areas where there is no job image area. This ensures that the contact pressure of the anilox to coating plate remains consistent and that there is no abrupt contact or pressure difference at the lead or rear edges of the job image area that could contribute to beading, variance in coating film thickness or poor image quality. Additionally, these support bars maintain constant impression contact to the substrate which prevents the substrate from moving freely on the impression cylinder surface if no contact was present.
Coating Pumping System	Since glitter UV coating products can be higher in viscosity compared to general-use UV coating products, it may be necessary to use a special coating pump to avoid chamber starvation due to poor pumping/circulation. This can be dependent on the coating area of coverage and press speed which will determine the consumption rate for the glitter UV coating in terms of the coating pump being capable of pumping at the necessary rate to keep the coating chamber filled. Diaphragm pumping systems may be unable to properly pump a high viscosity coating product at the needed rate to keep the chamber filled. In this case, an alternative pumping system such as peristaltic may be required, due to the ability to effectively pump high viscosity liquids. Peristaltic pumping systems are capable of creating more consistent coating flow and less entrained-air foaming compared to diaphragm pumps, which can improve the quality of the glitter coating results. Segregated coating circuits are recommended for specialty coatings and general-use coatings to avoid cross-contamination and extended clean-up times when switching back and forth.
Mixing System	Glitter UV coating products should be mixed thoroughly prior to circulation as the glitter particles can settle over time. The use of a drum-mixer is recommended when available. If a drum-mixer is not available, or if running from pails, the use of a hand-held drill with mixing-blade attachment is recommended for use. The mixing-blade can be sourced from a hardware store and is suitable for use with grout/thin-set. During glitter UV coating use, continued slow agitation is recommended. Over-agitation should be avoided as to prevent foaming to occur in the coating container which can contribute to pumping/flow issues.

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Process Considerations

Manual Mixing of Grit Material	When mixing dry glitter material press-side to a base coating, first ensure that the base coating is suitable for use with the glitter particulate. The use of a protective respiratory mask and eye protection is advised as the glitter material is very fine and can become air-borne during handling. The use of a mixing system is necessary to blend the glitter material completely into the base coating; a drill with mixing-blade attachment is suitable. Prior to adding the glitter material, begin mixing the base coating to create a small vortex in the coating container. Begin adding small amounts of the glitter material into the vortex to blend and distribute evenly throughout the coating, taking care not to allow the glitter material to collect on the coating surface as it may become air-borne and contaminate the surrounding area. Slowly add and blend all glitter material until the desired concentration has been achieved. The recommended concentration of glitter is based upon the desired visual result and can be made by CAC.
Press Speed	Using a high volume anilox roll can necessitate a reduced press speed to avoid issues of coating spitting, slinging and misting.
Chamber-Anilox Contact Pressure	Chamber contact pressure to the anilox roll should be minimized to optimize metering while reducing blade wear. Excessive chamber contact pressure to the anilox can result in the metering blade flexing inward and lifting which can contribute to insufficient metering of the roll surface and heavy coating application. A good practice is to incrementally reduce overall chamber contact pressure to the anilox until the roll surface is visibly covered with heavy coating, then incrementally increase chamber contact pressure to the anilox until good metering is observed. If the contact pressure to the anilox appears uneven/nonparallel, it is important to re-set the chamber contact to the anilox using the method/settings prescribed by the chamber/press manufacturer.
Application: Anilox-Coating Plate Contact	Application contact should be minimized to provide sufficient coating transfer to the coating plate surface while avoiding excessive pressure which can contribute to quality issues. Observation of a coating-stripe of the anilox to the coating plate can be an acceptable method to determine proper application contact, setting a minimum stripe recommended by the press manufacturer. If an accurate coating-stripe cannot be achieved due to the high anilox volume, the use of a “break-away” method can be used by incrementally reducing application contact pressure until an incomplete coating image is achieved, then incrementally increasing application contact pressure until the coating image area is complete. Insufficient application pressure can result in an incomplete coating image or insufficient glitter transfer. Excessive application pressure can result in beading along the image area relief edges, in particular the lead and rear edges and uneven distribution of the glitter particles over the image areas.
Impression: Coating Plate-Substrate Contact	Impression contact should be minimized to provide sufficient coating transfer to the substrate while avoiding excessive pressure which can contribute to quality issues. The use of a “break-away” method can be used by incrementally reducing impression contact pressure until an incomplete coating image is achieved, then incrementally increasing impression contact pressure until the coating image area is complete. Insufficient impression pressure can result in an incomplete coating image and poor glitter transfer. Excessive impression pressure can result in beading along the image area relief edges, in particular the rear edge and loss of image detail. Additionally, excessive impression pressure can meter the glitter particles from the coating plate surface resulting in poor glitter distribution and concentrated areas of glitter along the coating plate relief areas in heavy coating beads.
EOP-UV Curing	Cure-response for glitter UV coating is formulated to account for reduced press speeds and increased dwell of the EOP-UV curing system. Typical EOP-UV settings for general-use UV coatings can be employed without over-cure of the glitter UV coating despite reduced press speed. Glitter UV coating is formulated with improved film flexibility to prevent a fragile film if over-cure does occur.

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Process Considerations - *continued*

Metering- Blade Wear	In order to preserve the integrity of the metering-blade and extend blade-life, it is recommended to stop the anilox roll from turning during periods of non-production to prevent abrasion.
Cleaning	Removal of the residual glitter material after use may require several cleaning cycles of the coating circuit and removal/cleaning of the chamber, recovery pan and hoses. It is best to utilize separate coating pumps and hoses for speciality coating products to segregate from general-use products to minimize cross-contamination when moving from speciality coating products. This enables quick change-overs to minimize down-time and allows for cleaning of the speciality coating system to be done off-line from the press. Cleaning the residual glitter particles from the anilox may involve using an anilox brush and cleaning paste.

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