



TECHNICAL C&A INFORMATION

Textured Grit UV Coating - Sheetfed v1.1

Textured grit UV coating products can bring depth, contrast and a tactile enhancement to a printed piece, but is a specialized technique that requires proper planning, application equipment/materials and experience to make it an achievable and repeatable process. The result of a properly produced textured grit piece is a significantly textured coating film with the tactile feel and appearance of sand-paper while maintaining clean edges when applied for detailed graphics.

Application Considerations

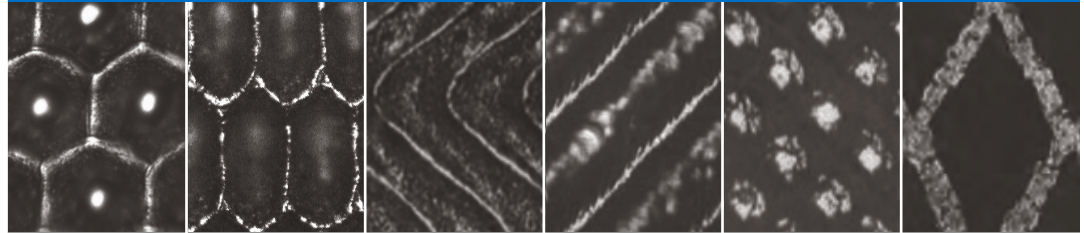
Design/Layout	Placement of a textured grit coating on a printed piece should not be positioned in areas that will include scoring, folding or cutting. Due to the abrasiveness of textured grit UV coating, scoring rules and cutting blades/dies may become damaged when contacting the coating material. Due to the inability of the grit material to flex/stretch/bend, coating applied along folded edges may result in cracking occurrence.
Adhesion	Testing the adhesion properties of the textured grit coating over inks, primer coating and substrate should be conducted prior to production. When applying a textured grit 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 that can be caused when using textured grit UV coatings. Distortion/curl can be related to the textured image graphics and the grain direction of the paper.

Process Materials

UV Coating Product	Textured grit UV coating products are specialized formulations that enable a thick film to be applied while maintaining good characteristics for film cure-response, flexibility and adhesion. Additionally, textured grit 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 grit particles. The grit 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. The grit particles are available in various sizes depending on the press equipment capabilities and desired textured effect, as well as gloss and matte finishes.
Anilox Engraving Selection	Due to the size of the grit particles and associated transfer requirements, 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 textured grit 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 grit particles are desired, a diamond engraving can be employed to control the coating application rate to avoid over-application or spitting/slinging while ensuring textured grit transfer.

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Textured Grit UV Coating - Anilox Recommendations



	Hexagonal	Elongated Hex	Channel-Wave	Tri-helical	ART(Pins-up)	Diamond
Cell Structure	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	20 - 50	20 - 60	40 - 85
LPI	140 - 180	140 - 180	140 - 180	75 - 140	60 - 140	40 - 100
Textured Grit Particle Size	< 50 µm	< 50 µm	< 50 µm	50 - 100 µm	50 - 100 µm	80 - 200 µm

Process Materials - *continued*

Anilox Engraving/ Coating Viscosity Correlation

The use of a high volume anilox roll for textured grit 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 excessive grit 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 textured 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. While most general-use UV coating products for sheetfed applications have a viscosity range of 250 - 350 cps, a textured grit UV coating can have a viscosity range anywhere between 800 - 1800 cps.

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 textured grit 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. In most cases when using textured grit UV coating products, fine/detailed graphics are avoided in which case 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.

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 grit material can promote blade wear. A flexible polyester blade material is most suitable for this position.

Process Materials - *continued*

Coating Plate Material

Typically, textured grit UV coatings are applied to create coarsely 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 grit particulate 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 grit 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 textured grit UV coating products are generally 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 textured grit 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 textured results. Segregated coating circuits are recommended for specialty coatings.

Mixing System

Textured grit UV coating products should be mixed thoroughly prior to circulation as the grit particles can settle over time. The use of a drum-mixer is recommended when available. During textured grit UV coating use, continued slow agitation is recommended.

Manual Mixing of Grit Material

When mixing dry grit material press-side to a base coating, first ensure that the base coating is suitable for use with the grit particulate. The use of a protective respiratory mask and eye protection is advised as the grit material is very fine and can become air-borne during handling. The use of a mixing system is necessary to blend the grit material completely into the base coating; a drill with mixing-blade attachment is suitable. Prior to adding the grit material, begin mixing the base coating to create a small vortex in the coating container. Begin adding small amounts of the grit material into the vortex to blend and distribute evenly throughout the coating, taking care not to allow the grit material to collect on the coating surface as it may become air-borne and contaminate the surrounding area. Slowly add and blend all grit material until the desired concentration has been achieved.

Process Considerations

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 grit 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 grit 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 grit 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 grit particles from the coating plate surface resulting in poor grit distribution and concentrated areas of grit along the coating plate relief areas in heavy coating beads.
EOP-UV Curing	Cure-response for textured grit 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 raised UV coating despite reduced press speed. Textured grit UV coating is formulated with improved film flexibility to prevent a fragile film if over-cure does occur.
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 grit 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 grit particles from the anilox may involve using an anilox brush and cleaning paste.