Energy-Cured Coatings – Matte Particle Concentration

Scope	- Energy-Cured matte coating products are formulated by adding matting/flattening particles to a gloss coating base to create a visual/measurable matte finish to the applied coating film. - When the base gloss coating and matting particles are consumed at the same rate during coating application, the result is consistency in coating viscosity and visual/measurable gloss during the consumption of the entire coating container. - If the consumption of the base coating and matting particles are not at the same rate, the result can become a disproportionate amount of matting particles remaining in the coating container which becomes concentrated as the container is consumed – this results in problems such as an increase in coating viscosity and lower visual/measurable gloss of the applied coating film as the coating container is consumed. - Increased viscosity due to matting particle concentration can result in: • Pumping/flow issues • Chamber starvation • Matting particle build-up in the chamber cavity • Matting particle build-up in the chamber recovery pan – high-level sensor activations • Foaming • Terminal viscosity – coating will not pump/flow - Increased matting particle concentration in the coating container can result in the applied coating film exhibiting lower visual/measurable gloss compared to previously coated sheets from the same container – this creates gloss variation on sheets produced from a single coating container.
Pre-Mixing	- As the Energy-Cured matte coating ages in the supplied container after manufacturing, the matting particles can slowly fall from suspension and settle towards the bottom of the coating container. - Prior to using any matte coating product, the coating should be mixed thoroughly in the supplied coating container prior to checking for viscosity compliance and circulation for press use. - Pre-mixing should be thorough to achieve a homogenous condition in the supplied container – this is regardless of a new/unused container or used/partial container. - Depending on the container size, an appropriate mixing tool should be used – tote-mixer, drum-mixer, pail-mixer/drill with mixing-blade attachment. - Consult the 'INXCAC – General Information, Mixing' technical document for mixing best-practices.
Agitation	- Matte coating should be continuously agitated during press use to maintain homogenous matting particle distribution and consumption. - When using a mixing system that allows for constant coating agitation during production/use, care should be taken as to not over-mix/aerate the coating, particularly as the coating container is consumed and the mixer propellers reach the coating surface. - Agitation, unlike pre-mixing, does not require a high mixer speed to keep the coating/matting particles homogenous – slow agitation is employed to maintain coating movement in the container which also aids in the removal of entrained air that is returned from the coating system.
Anilox Engraving	- 'Open' anilox cell engraving types such as tri-helical and channel-wave/sinusoidal are recommended for use with Energy-Cured matte coating as the open engraving pattern allows the matting particles to more efficiently enter the cell cavity for transfer to the coating blanket/plate. - 'Closed' cell engraving types such as hexagonal can impair the capability for the matting particles to efficiently enter the cell cavity for transfer to the coating blanket/plate. - If using a closed cell engraving type, a larger cell opening/LPI specification may be helpful to ensure a more efficient transfer rate of the matting particles to avoid particle concentration in the coating container.

	- Anilox engravers typically have a LPI range for a specified engraving type and volume/bcm – using a lower LPI from the range can be helpful as it creates a larger cell opening while maintaining a controlled transfer efficiency.
Anilox Volume	- In order to ensure a consistent consumption rate of both base coating and matting particles, the appropriate anilox volume should be used to ensure successful results. - Insufficient anilox volume, particularly when using a closed cell engraving type, can result in the base coating being consumed at a higher rate than the matting particles contributing to matting particle concentration as the coating container is consumed. - An anilox volume of 10 - 12 bcm is recommended for use with Energy-Cured matte coating products for optimum results for low visual/measurable gloss and homogenous consumption of coating/matting particles – if using an open cell engraving type, a lower volume anilox could be used compared to a closed cell engraving type. - A lower volume anilox typically creates the lowest visual/measurable gloss results using matte coatings, however, is most likely to contribute to matting particle concentration as the coating container is consumed – a balance between anilox volume/coat-weight/relative gloss and sustainability of coating/matting particle consumption is key for achieving consistent results.
Roller/Nip Coater	- Using roller/nip coating systems, the metering/nip must allow the matting particles to transfer through to the coating blanket/plate. - If the metering/nip setting is too tight, the matting particles may not transfer consistently through to the coating blanket/plate – this could be related to the nip setting being too tight and/or the rubber roller being too hard in durometer/shore A. - If the matting particles are not transferring efficiently through the metering nip of the coating system, matting particle concentration in the coating container can be the result.
Particle Hard Settling	- When matting particles fall from suspension and settle on the bottom of the coating container, the matting particles typically 'soft settle' and can be easily reincorporated into the base coating by thorough mixing – this restores the homogenous coating condition that was created during manufacturing. - In cases where 'hard settling' occurs, the matting particles can settle into a hardened, concentrated solid at the bottom of the coating container that cannot be mixed and re-distributed though-out the base coating. - 'Hard settling' can be determined by surveying the bottom of the supplied coating container using a paddle – the hardened matting particle concentration can be felt by trying to scrape the container bottom. - Use of coating that has suffered 'hard settling' can result in a higher than desired visual/measurable gloss of the applied coating film as the coating that can be used does not contain the intended percentage of matting particles. - Additional problems of coating pump/system contamination and clogging can occur if a piece of hard settled matting concentration is sucked into the coating intake tube.
Gloss Variation	- Visual/measurable gloss of an applied Energy-Cured matte coating film can vary due to changes in: • Film thickness • Matting particle concentration in the applied film • Film smoothness – directly impacted by flattening particle concentration • Film defects such as voids/pinholes - Due to these process variables, variations in gloss can be experienced during a single job or a sequence of jobs when consuming a common coating container despite all other process variables remaining constant. - Conditional changes of the coating in the supplied container for matting particle proportion/concentration, viscosity and entrained-air/foaming can all contribute to gloss variation on the printed/coated sheet. - As a rule, a measurable variation of +/- 5 gloss units can be experienced from a single matte coating container with all other variables remaining constant. - In cases where matting particle concentration occurs during use, 'hard settling' has occurred in the coating container, coating viscosity has increased or entrained-air/foaming has occurred, one or more of these variables can directly contribute to a measurable gloss increase or decrease >5 gloss units.