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Original Submission:

We have experienced in recent times that liquid coatings have become a target of cost and usage optimization. The key factor that controls functionality and economics is the thickness being applied. First and foremost is functionality or doing what the coating was intended to do. Too much or too little it may not perform to its intended use. Secondly, it becomes a matter of economics, why put down 4 microns if 3 microns will give you the functionality that you are searching for.
Applying, measuring and maintaining the correct coating thickness are all part of the optimization. The emphasis on correct and precise coat weights has made it more important to make sure any data gathered for the calculation of anilox volume is valid.
My focus would be on both the above functionality and economics on how to determine true transfer efficiency to maximize/apply the proper coating thickness based on application weight and mathematics.

Extended View:

In all coatings it is pertinent to initially comprehend the primary function of the coating. What is supposed to do? Can we measure it? How do we apply it? From the printer's perspective it is pertinent to involve the anilox (whether chrome or ceramic) provider and the supplier of the coating to ensure that all parties are clear on the objectives and intended use.

In order to understand transfer efficiencies it becomes essential that the parties understand differences in chrome vs ceramic and the impact the cell structures have in relation to the finished product. Cleanliness of the cells, size of cells and walls will all have some impact on how much of the coating will be delivered to the substrate.

Once we understand the delivery device being used and how it can affect the performance on the coating we can take a closer look at the details of the coating.

As Listed Below:

Application Target Range: This is the suggested application range suggested by the coating supplier. This can be supplied in weight or thickness whether it be grams/m2, lbs/rm, mils or microns.

Coating Weight Measured: What are the means used to measure? Dry or Wet.

Ream Size: Sample are of which coating is measured

Coating Type: Is it Water based, Solvent or UV

Coating Material: Type of Coating

Coating Specification: Percent of solids, Weight per Gallon and Viscosity as applied. Also Ph can be a factor.

Application Target Range:	_____ to _____ pounds per ream _____microns film thickness
Coating Weight Measured:	☐ Wet ☐ Dry
Ream Size:	_____432,000 sq. in. web / film (3000 sq. ft.) _____144,000-sq. in. narrow web / sheet (1000 sq. ft.)
Coating Type:	_____Water _____Solvent _____UV
Coating Material:	_____Glue _____Adhesive _____Varnish _____Silicone _____Scratch-off _____Laminate _____Other Other: _____
Coating Specifications:	_____Percent Solids _____Weight Per Gallon _____pH Range _____Viscosity; _____#2 Zahn _____#3 Zahn

Information on the coating is crucial and the majority of this information can be obtained by reviewing the MSDS and technical data sheets. Since the coating is well understood the next step is to understand how the transfer will take place. This has a major impact on how much material will be delivered to the substrate and how it will lay on the substrates surface.

The following is based on historical lay-down of the coating and the mechanics of how it is currently laid down or the future attempts to lay down the coating:

Current Weight: Historical data on what the customer is currently getting (weight/thickness).

Current Anilox: What anilox specifications are we using now to achieve above thickness/weight results.

Current Lines Screen/Volume: Cells per linear inch and amount of coating per square inch carried by the anilox.

Geometry: Cell structure pattern.

Type of Coater: How does the material transfer to the substrate; directly or indirectly to the web.

Drive System: What is used to drive current system.

Metering System: What is used to shear current coating.

Current Weight Applied:	_____
Current Anilox Type:	☐ Chrome ☐ Laser ☐ Mechanical
Current Line Screen & Volume:	_____
Geometry:	☐ 60-deg ☐ Quad ☐ 30-deg ☐ Trihelical ☐ Other _____
Type of Coater:	☐ Flexo ☐ Gravure
Drive System:	☐ Direct 1:1 ☐ Variable Speed
Metering System:	☐ 2-roll ☐ RADB ☐ Enclosed DB ☐ Trailing Blade

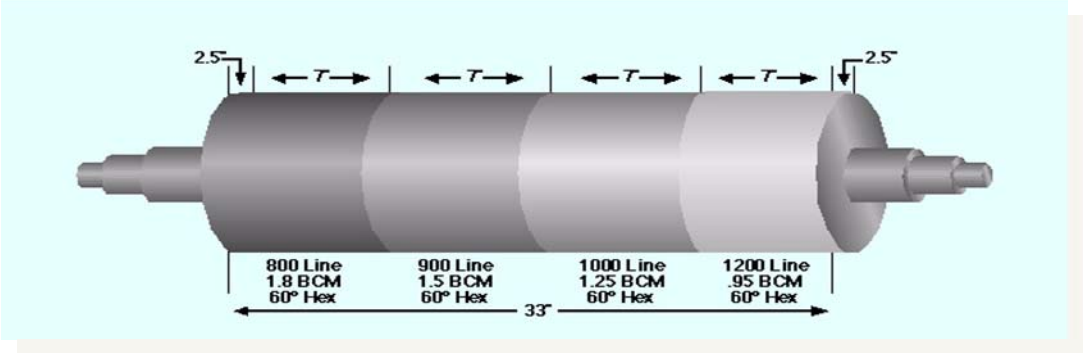
In this example we have identified, the coating and a target of how much is needed and how it will be applied to the substrate. This is all done through communication between anilox and coating suppliers and the converter by documentation for the intended outcome. In order to achieve the coat weight needed for the product to take on its functional properties, the group needs to decide by calculation the volume needed to achieve that functionality. This is a mathematical calculation that needs to be scrutinized. All the information above is utilized in one respect or another to decide on an appropriate anilox.

The one unknown in the calculation is the % of transfer efficiency that takes place. Transfer efficiency is simply how much product will be pumped through Anilox, sheared through a delivery device and accepted by the substrate. Although all the above is factored into it there is no scientific way to know the exact amount that will ultimately make it to the end product.

Due to this variable it is easy to get very close to the targeted weight but being exact should be the goal. There is a point where not enough can cause the material to fail as well as too much, not to mention additional material applied costs more.

Applying too much material can cause a failure to the end product but also has a high impact on cost of the product. If a product is said to require 1 lb per 3000 square feet how do we know if .9 or .95 lbs per 3000 square feet will perform equally? In this example the savings is automatically 5%-10% in the cost of coating used. How do we determine if this is an option? As a converter we are faced with R&D and testing to provide the best product at the least cost without compromising the functionality of the product. One option is to perform a banded roll test. This option involves controlled testing considering minor changes in volume to minimize the coating without sacrificing quality or functionality of the product

Banded Roll Example:



By making minor changes in volume we can make minor changes to the amount of material being applied thus controlling costs and maintaining expected quality and functional outcomes of our products.

All these factors above have an impact on the quality of our product, intended outcomes and the cost it takes to produce.