Have you been involved with a situation where a product failed because you applied too much or too little of a coating? Perhaps you selected a recommended anilox but just didn’t get the expected results. Whichever the case, the end result is that you are not getting the functionality of the product your customer needs. So what should you do to get positive results? The key to making a coating application successful is getting good information to calculate the required volume.

Volume determination requires you to take a few steps. Typically, your primary objective is to understand where to obtain the information, and the second step is to document what information is important. Once you get all the required data, work with the anilox supplier to calculate what anilox you will need. Detailed below in sequence is the method used for getting information and discerning what facts are important to a calculation for required volume.

CONTACT/GENERAL INFORMATION
This is required from all parties, especially the customer and the coating supplier. Contacts are critical for confirming data and collecting missing information. General information would include the specific coating information, such as the product number, physical data contained in an MSDS, and any information related to the composition of the final wet or dry product going to press for printing. Specification/technical sheets are also available for coatings, which generally describe proper application requirements.

Technical information is always useful in single-component coatings (like UV and water-based, where the product receives very little alteration from supplier to press) and critical in the case of solvent coatings, which become complicated by the addition of solvents/dilutions, as well as cross-linkers or any other materials. Don’t overlook dilution and mixture schedules. They become important guides in the calculation of coat weight. Once you have gathered all available information about the components of your product and the contact information for the persons who are the experts you can rely on for good advice, it is time to disseminate the information.

APPLICATION TARGET RANGE
In other words, determine how much coating you want to apply over how much area. Application targets are commonly defined by coating suppliers in the following: imperial unit of pounds per ream or metric in grams per square meter (gsm). Make sure you have the correct unit of measure. Ream size is the area covered by the application target weight.

Other possible choices for describing the application target are micron or mil value for film thickness. If you are given a range (example 1.0 to 1.5 lbs/ream), be sure to include it and be prepared to refine the value. Typically, if the weight in that range is non-specific, the median weight of 1.25lbs/ream from the example would be the default target. Contact the coating supplier to clarify the range to a specific target weight.

COATING WEIGHT MEASURED
There are two possibilities for the measured coat weight; wet or dry. Dry weight is what you would expect to have for your target after the substance dries on the web. Wet weight comes before the drying process of water or solvent systems. The weight of UV does not change because there is no evaporation, just cross-linking and solidification of the coating, so it can be considered wet or dry. The solids content considered in the application of water or solvent-based coatings is affected by wet or dry designation, so always clarify.
REAM SIZE
This defines the area where the coat weight target is applied.

Common imperial unit choices:
- 1,000 sq ft (144,000 sq in.)
- 3,000 sq ft (432,000 sq in.)

Metric choice:
- Square meters

The area must be clearly defined because the difference between the two ream size choices, shown above, is a factor of three, which in a calculation can triple or cut to one-third the volume required. If someone tells you a certain weight must be applied, ask over what area and how they define the units. The ream size or area of coat weight can get complicated when printing spot coverage instead of a flood or 100 percent coverage, so keep actual printed/coated area in mind.

COATING TYPE
Is this a water, solvent or UV application? Knowledge of this helps to identify issues within the data of the coating application such as how many actual components are involved and any complications the coating may present to the anilox, namely corrosion potential.

COATING MATERIAL
What you are trying to apply, be it lamination, glue, varnish, silicone, etc. in general terms.

COATING SPECIFICATIONS
This refers to data related to coating specifications and must be verified and agreed upon because the calculation significantly depends on their values:

Percent Solids. Very simply, the term “percent solids” is the amount of solids left over in the dried coating or adhesive from the original wet printed film, ideally applied at a printable viscosity. It is very common that the amount on a specification sheet will not take into account the addition of reducers to water and solvent based applications. Reduction in viscosity will change the concentration of solids by dilution in the wet film, and thereby lower the percentage of solids, and the corresponding yield, once dried.

Weight per gallon. How much does the coating or adhesive weigh in pounds per gallon of material. WPG is affected by reducer additions, which tend to lower the actual weight per gallon. Be sure you discuss with the coating supplier whether the product will need any reduction, or if it can be used without alteration.

pH Range. For water-based applications, low pH (less than 5.0) and very high pH (more than 11.8) will indicate a potential for corrosion. Steps must be taken to apply a corrosion barrier to the anilox base cylinder, which will help increase corrosion resistance.

Viscosity. Viscosity specifications give you a better understanding of potential flow resistance and will indicate, in many cases, the proper cell geometry to promote release. Higher viscosities tend to fare better on 30 channels, quads and trihelicals, depending on run speed. It is important to note any differences between printable and incoming viscosity because, if a dilution/reduction was made, it lowers the percent solids.

CURRENT WEIGHT APPLIED
If this is a situation where you are already applying a particular product, record what are you currently targeting and achieving. The data is useful in verifying/projecting required anilox volume for the new coat weight target.

CURRENT ANILOX TYPE
Most aniloxes are ceramic, but chrome cylinders are still available and have a different release characteristic. It is important to distinguish which type is in use when determining volume in comparison to current use.

CURRENT LINE-SCREEN/VOLUME
This information is frequently a great guideline when projecting/verifying data based on history and samples.

GEOMETRY
The most common choices are 60 degree, 30 degree channel, 45 quad or trihelical. Anilox suppliers are well-versed in determining the correct geometry depending on viscosity/flow issues, press speed, etc.

TYPE OF COATER (FLEXO OR GRAVURE)
If a plate or tint sleeve is used, then consider this a flexo application and the deposit efficiency runs 19 to 23 percent. If the transfer from the anilox is direct to the substrate, this constitutes a gravure-style application (even on a flexographic press) and the deposit efficiency jumps to 39 to 43 percent. Failure to distinguish between the two styles can affect an error by doubling or halving the volume calculated. Be sure to verify.

DRIVE SYSTEM
There are two types: direct and variable. Direct, or 1:1 ratio, does not effect the basic calculation. This means in essence the anilox surface matches the pace of the plate surface for flexo and matches the nip surface and web for gravure.

Variable Drive can change the deposit through adjustment. Know how much adjustment you have and whether or not the data was taken with the rotation maximized or minimized. Optimally, have the rotation somewhat neutral to allow for freedom of adjustment as necessary at press.

General concepts for variable speeds, assuming the anilox is clean:
- If the anilox rotation is with the flow of the web and the rotation is maximized (faster than web), that is the most coating you can apply.

Diligent documentation starts with a coating application worksheet.
• If the anilox rotation is with the flow of the web and the rotation is minimized (slower than web), that is the least amount of coating you can apply.
• If the rotation is against the flow of the web and the rotation is minimized (slower than web), that is the least amount of coating you can apply.
• If the rotation is against the flow of the web and the rotation is maximized, that is the most amount of coating you can apply.

METERING
Metering describes how the anilox surface is controlled, be it by blade or rubber roll. It is important to note the difference. Two-roll, un-bladed systems are not consistent in application and cannot be calculated accurately based on the anilox used. Press speeds, metering pressure and hardness of the rubber meter roll can change the coat weight in two-roll, un-bladed systems. Chamber and reverse-angle doctor blade systems contrast un-bladed systems by providing consistent delivery at different speeds.

Keep in mind that, although it is difficult to determine from the anilox end how much coating is transferred in a un-bladed system, the printed product from two-roll systems allow for the deposit weight to be calculated and the material tested for performance. You can use the samples for determining targets for a bladed system. Contact your coating or anilox supplier to assist you in calculating the weight difference.

SUBSTRATES
It is always a good idea to include information about substrate construction. The basis of the construction—film, film/paper, BOPP, etc.—is helpful in looking for cases of incompatibility (meaning the product won’t interact as anticipated with the substrate) or dive-in on the substrate. Any time the construction is changed by material substitution, the coat weight needed may change drastically.

Coating applications do not have to be difficult, but getting the right result instead of many wrong results requires diligence in information gathering and verification. The sole purpose of the exercise is to dissipate variability and error from the final calculation, so you apply a correct and consistent amount of coating. Rely on your coating and anilox supplier for assistance in gathering information and understanding the transfer process. If data is not available, there are still ways to find a solution. The follow up article in this two-part series (see FLEXO Feb. 2010) will discuss both the effects of ranges and mistakes in the coating application and avenues for determining coat weight when the numbers are unavailable for complete calculations.