

Film Weight Control

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These are suggestions or guidelines to determine what variables affect films weights on coated sheets.

• Coating material operating temperature:

- Check the Technical Data Sheet (TDS) for the suppliers operating temperature.
- Adjust the coating temperature if it is different from the specification on the TDS.
 - The idea method to adjust the viscosity is using a coating heater.
 - Coating that is below, colder, than the specified operating temperature will result in increased film weights.
 - Check your film weights, side-middle-side, adjust accordingly.
 - If the coating must be warmed up use a drum heater, the drum of coating must be slowly mixed with an air operated mixer during the warm up time.
 - The quality of the coating could be affected by excess heat if not mixed during the warming up process.
 - The TDS will specify the maximum temperature, do not exceed it.

• Coating stored in drums and/or bulk tank must be mixed/agitated before being used:

- Drums of coating can be mixed using an air-operated mixer in the drum of coating.
 - The mixer should not be operated at the maximum speed to thoroughly mix the coating.
 - If the mixer is at maximum speed air bubbles will be created in the coating that could appear on the coated sheets.
- Another method used is a drum tumbler. The 55-gallon drum is clamped into the tumbler drum bracket then the drum is rotated end over end mixing up the coating inside the drum.
- Bulk tank storage systems usually have a mixing blade or re-circulation system installed inside the tank to continuously recirculate the coating stored inside.
 - If a mixer is used it should run no longer than 5 minutes per hour. This depends on the chemistry of the coating, check with your supplier.
 - The re-circulation system can run continuous, check with your supplier.
- Failure to properly mix a coating before use could result in the film weight running out of specification.
 - Coatings have a pigment to binder ratio that must be maintained. A coating consists of a binder, these are chemicals that when activated by a source will cross-link or cure the coated film.
 - A binder also is a carrier of pigments that are part of the chemistry of the coating. when not being used the pigment will settle out in a drum of coating. If this drum of coating is used that has not been properly mixed the pigments settle to the bottom, that area will have a lot of solids and will apply at a heavier film weight versus the other part of the drum with the binder and very little solids.
- The supplier may recommend mixing the coating in the supply pan during the operation of the coater. Some coatings may have a very high pigment percentage, which will require mixing in the supply pan. Check the CMDS, check with your supplier.
 - If an air operated mixer is used in the supply pan do not run it at the maximum speed. Running the mixer at high speed will cause bubbles to form in the coating that can result in eyeholes in the coated sheet plus have an affect on the coating weight. A moderate speed is acceptable, check with your supplier.
- The re-circulation process, from the supply pan to the coater then back down to the supply pan, maybe enough mixing for a coating. Check the TDS, check with your supplier.

- Coating supplied at the specified weight per gallon and % solids:
 - *“This situation is normally not a problem.”* The coating supplier manufactures a coating at a specification listed on the TDS, the coating is certified by the supplier to fall within the indicated specification. The coating batches will vary within the specified range. If the coating is supplied at the low end of the range the film weight will run to the low side of the film weight specification when using an anilox roll. Conversely if the coating is supplied at the high end of the range the film weights will be higher. A film weight control chart should be used to spot film weight trends. A test can be performed on suspect batches to determine if the coating has been made within specification.
- Coating supplied in a 55 gallon drum:
 - After the coating has been used up in a drum a certain amount clings to the inside body, top and bottom of the drum, this is called clingage. Drums should be allowed to set upright for several days then pour out what is remaining from the inside to determine the clingage.
 - This loss should be considered in a budget.
- How a coater can affect film weight control:
 - Composition roller:
 - The roller runs on journals which must be maintained to the manufacturers specification, they will wear in time. Undersize surfaces will cause the roll to "float" up and down resulting in film weight variation.
 - Bearing boxes must have the correct size bearings in them that are in good operating condition. Worn bearings will cause the roll to "float" up and down resulting in film weight variation.
 - Check the film weight on a sheet starting at the edge of the sheet moving to the opposite end. Film weights should be checked across the width of the sheet, side-middle-side for up to a total of 15 measurements. This extensive analysis will highlight the film weight variation on a coated sheet. A statistical chart can be developed to determine process control or an out of control situation.
 - Regrinding a composition roll:
 - The condition of the surface of the composition roll is vital for proper film weight control.
 - A highly polished roll surface is required for a uniform appearance and application of the coating being applied to the sheets.
 - If the composition roll was ground too quickly or too much urethane was ground off during the regrind the surface will have a rough appearance. This rough appearance will transfer into the coated surface on the sheets similar to an orange peel look, aside from a poor visual appearance, film weight could be effected.
 - As the composition roll is being reground heat is built up between the grinding stone and composition roll, if too much heat is built up then the composition rolls surface will have high and low spots/sections, these high and low areas will result in film weight variation on the coated sheet.
 - If the composition roll supplier grinds the surface of a coating roll without letting the roll cool down enough after it comes out of the enclave (curing oven) there could be high and low spots/sections in the rolls surface also resulting in film weight variation.
 - This is readily apparent when pressure is applied between anilox and composition roller, if this condition is present you will see the “high” and “low” sections as you apply pressure between the anilox and composition rolls.
 - To correct this situation an operator would apply additional pressure between the rolls until an over all wet look is achieved. At this point the film

weight will not be correct as pressure can affect film weight and excess pressure can affect the condition of the bearings, gears, etc.

- The composition rolls surface must be washed down with solvent after use then stored for several days to let the composition roll “dry out” before being reground.
 - If the roll is not properly cleaned a highly polished surface will not be achieved during the regrinding process. The coating or solvents on the surface will accumulate on the grinding wheel resulting in a poor regrind.
- Grinding a composition roll on bearing surfaces versus centers.
 - A composition roll runs on bearing surfaces in the coater, when grinding the surface the lathe must be setup to grind on bearing surfaces.
 - A composition roll also has centers on the shafts but they are not maintained so if they are used to grind a roll then the film weight will vary, the roll will not run true in the coater.
 - The bearing surfaces must be maintained to keep them at the proper size, as they wear they will become undersized. When undersize they will float in the bearing boxes resulting in film weight variation.
- Anilox roll effect on film weight:
 - The cells on anilox rolls must be thoroughly cleaned after each use. If coating is allowed to dry in the cells they will not hold the required amount of coating.
 - Approximately 75% of a coating is released from a cell during the coating operation. Dried coating in a cell will negatively affect the volume in the cells reducing the film weight.
 - The anilox roll rides on bushings in the systems frame. Periodically check the condition of the bushings to insure they are in good working condition. If the bushings are worn the anilox roll will float up and down in the frame resulting in film weight variation. Hydraulic pressure from the coating in the anilox chamber can also push against the anilox roll resulting in film weight variation.
 - The proper amount of pressure between the anilox roll to the composition roll is necessary to obtain the proper release of coating from the cells on to the surface of the composition roll. Too much pressure can result in a reduced amount of coating being released from the cells or conversely not enough pressure will cause a coating void effect, similar to eye-holes.
 - During the coating operation the chamber on an anilox roll is filled with coating, the coating is forced into the cells by the doctor blades, one steel and the other plastic, they also wipe off the excess coating from the surface of the anilox roll.
 - If too much pressure is applied between the blades to the anilox roll they will bend resulting in a poor wipe, the loss of using the edge of the blades to wipe the coating off the surface of the anilox will affect the film weight, the surface will not be wiped clean.
 - The film weight can also be affected if 2 steel or 2 plastic blades are used to wipe the surface of the anilox roll. It is important that the combination of plastic and steel be used.
 - Using 2 plastic blades can increase the film weight to a small degree.
 - Inspect the edges of both blades if they show wear the film weight will be affected resulting in film weight variation replace the blades.
- Best practice for taking film weights:
 - A best practice must be established to insure a uniform procedure is set up and followed by the operators when taking film weights to insure consistency.

- The preferred method is weigh-strip-weigh.
 - A disk should be punched out of a coated sheet of metal after it has been cured.
 - The coating from the side of the sheet being checked must be carefully removed with solvent and a stiff brush.
 - The surface of the metal must not be disturbed during the coating removal process. If tin is removed it could affect the film weight measurement.
 - If coating is on the other side of the sheet care must be taken not to remove it when stripping the coating that is being measured. If it is removed then the reading will not be accurate.
 - The balance must set on a vibration free base to insure accurate readings are being taken.
 - The balance should be located in a temperature-controlled room.
 - The door of the balance must be closed when a measurement is being taken.
 - The sheets being used to take the film weights will be part of the coating loss and must be figured into the coatings consumption.
- Film weight specifications:
 - Each coating has its unique film weight specification depending on what is packed inside the container. A particular coating may have multiple film weights specs for different packs. When budgets are built this must be taken into consideration. If a budget is built on one film weight or an average of several then coating consumption losses will occur.
 - What also must be considered is the specification used in a budget. For example if a pack requires a film weight spec of 18 +/-2 the budget must not be set for a film weight that is below 18, if it is then you will have to run the film weight out of spec to meet your budget and compromise the quality of the product and/or resistance/protection of the coating on the container. Statistically a film weight should run between the upper and lower film weight specs. A process control chart should be used to determine film weight variation.
 - Before changing film weight specifications check with the coating supplier or your technical service, quality department for guidance.
- Spoilage:
 - As spoilage is generated so is the loss of the coating. Spoilage is counted and must be considered as part of film weight losses to budget. Spoilage should be identified having an inside coating or an outside coating or both inside and outside when calculating how spoilage effects the coating consumption.

Bottom line losses are usually found to be a little of this and a little of that they all add up together and are part of a consumption loss.