

Coating

How to Guide

This How to Guide will take you, step by step, through proven techniques for coating PLUS photostencil emulsions.

Objective - To achieve consistent production of high quality stencils that meet all your screen printing requirements.

Recommendations:

Sensitising and mixing - PLUS emulsions are supplied either pre-sensitised, or with a separate Diazo sensitiser. The Diazo powder sachet is designed for direct addition to the emulsion without the need for pre-dissolving in water, this will ensure that the factory controlled viscosity is retained to give you the optimum consistency. Always use scissors to open the Diazo powder sachet to ensure you get a clean cut. Hold the open sachet 1 to 2cms from the emulsion surface and gradually sprinkle the powder onto the emulsion. Use a wooden, or plastic stirrer (never use a metal stirrer) to 'fold' in the Diazo powder to the emulsion, as this will minimise powder loss. The emulsion then needs to be mixed very thoroughly. **Top tip:** Always sensitise the emulsion at least 24 hours before it is needed in production to allow the Diazo to dissolve completely and for the emulsion to deaerate.



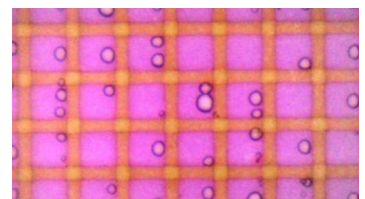
One-pot photopolymer emulsions also require mixing prior to their initial use, as the contents may settle slightly during storage.

Manual or Automatic coating - Excellent results can be achieved with both manual and automatic coating, however automatic coating machines typically allow a greater degree of consistency than manual coating. Coating machines are of particular benefit when processing very large screens, or where the screens are all the same size.

Coating trough selection - Selecting and then maintaining the coating trough is critically important for achieving a quality result. Troughs are available with either a sharp or round edge profile depending on what deposit is required. A sharp edge trough will deposit significantly less emulsion per coat than a round edge trough. The coating edge of the trough must be inspected regularly for any nicks or profile irregularities and replaced if damaged.

Coating technique - Coating pressure, angle and speed will all affect the amount of emulsion that is deposited with each pass:

- **Pressure** - A consistent pressure is actually more important than absolute pressure. Use sufficient pressure to ensure that the trough edge is in perfect contact with the mesh and that this contact is maintained throughout the stroke. The pressure may have to be increased slightly when using a high viscosity emulsion, to prevent it 'pooling' in the centre of the screen. A mesh deflection of 1 to 3mm at the trough edge is fairly typical depending on emulsion viscosity.
- **Angle** - Typically an angle of 15° to 30° from the horizontal is used. Once again maintaining a consistent angle is the most important factor. Many troughs have the end caps pre-cut to the appropriate angle.
- **Speed** - Always try to coat as slowly as possible as this will help minimise the amount of air trapped in the mesh openings. The coarser the mesh and the thicker the emulsion, the slower you need to coat. However, if you manually coat slowly, be careful not to introduce judder lines across the mesh. This picture shows air trapped during coating. As a rough guide, speeds can range from 80 to 300cm/min depending on the viscosity of the emulsion.



Top tip: Quite small variations in the depth of the emulsion in the coating trough can have a significant impact on the coating thickness. Where coating thickness is critical, i.e. four-colour halftone printing, ensure that the troughs are always filled to the same depth for each screen in the set.

Always wipe the coating edge clean immediately after coating

Coating regime - The number of coats you apply and the way you coat them is the best way to control the stencil Rz and EOM. For most screen printing applications the objective is to produce a screen that has a thin, flat stencil surface on the print side, with just a thin, fully cured layer of emulsion on the squeegee side. Stencil build comes primarily from applying multiple wet coats from the squeegee side, whilst stencil smoothness comes from applying thin, face-coats of emulsion to the print side.

The typical coating regime for manual coating is to apply 1 or 2 base coats of emulsion to the print side of the screen which 'fills' the mesh and then immediately apply 1 or 2 coats to the squeegee side. This pushes the wet emulsion back through the mesh to the print side, leaving only a thin, sealing layer on the squeegee side. With coating machines you have the capability to coat both sides with each pass, this is a very effective method, however ensure that the final pass for the base coat is always from the squeegee side.



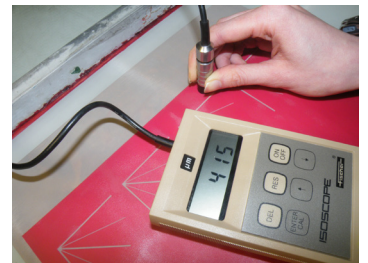
There are obviously many variations to the coating regime depending on frame size, mesh count, image requirements etc. but the principle requirement is always to start the base coats from the print side and finish on the squeegee side.

Face-coats - All emulsions lose volume during drying as the water evaporates and consequently they shrink back around the mesh fibres to leave an uneven surface. Face-coating is used to fill in these hollows in the uneven emulsion surface on the print side, to create a flat stencil surface (low Rz) which minimises saw-toothing during printing. Face-coating can only be applied to screens that have already been fully dried. Typically 2 face-coats are applied and then the screen is dried again. If an even lower Rz is required, then additional face-coats can be applied. Some coating machines are fitted with IR driers which facilitate intermediate drying and allow face-coats to be applied as part of a continuous production process.

Top tip: For high specification applications, a sharp edged trough can be used in conjunction with a round edge trough. Use the round edge trough for the base layer and the sharp edge trough for the wet-on-dry face-coats. This reduces the surface roughness (Rz) without significantly increasing the stencil profile (EOM).

Drying - Emulsion screens must be dried horizontally with the print side down. If the screens are dried vertically, the emulsion will 'curtain' as it flows down the mesh before drying. Screens should be dried thoroughly using warm, dry air (35°C, 10% RH) for best results. Drying is a critical step in the screen making process, so refer to the 'How to Guide to Drying' on our website for more information at macdermid.com/autotype

Measuring stencil profile (EOM) - The ability to measure stencil profile is critical for consistent screen printing, as even a +1µ difference in stencil profile can give a noticeable difference in wet ink deposit. A hand held coating thickness measuring device is simple to use on Polyester mesh and will give an instant reading.



Measuring stencil roughness (Rz) - A rough stencil (high Rz) will give poor print quality, so the ability to measure Rz is very useful. There are many portable Rz metres available today that will give you an instant measure of your stencil's surface roughness.

Coating ultra-thick stencils - There is a special technique for coating ultra-thick stencils (>200µ). Refer to the 'How to Guide to Producing ultra-thick stencils' on our website macdermid.com/autotype for more information.



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