



## PRINT FOR PROFIT #30

### CAPILLARY FILM OR DIRECT EMULSION

Blimey thirty of these columns that is 45,000 words and the three words that occur throughout these screeds are “Consistent, “Process Control.” The industry is definitely on the up and it is noticeable that the level of professionalism has increased.

The challenges are looming large in the form of rampant economies in China and India. “But they are on the other side of the world” you may say. No, they are plundering the supplies of raw materials. Just look at the escalating price of aluminium, oil, polymers and scrap metal. That knackered old  $\frac{3}{4}$  flat bed would in past times of found its way to these 3<sup>rd</sup> world countries and refurbished to be used for their home market. Not any more now the machine will make the same journey only to be melted down and recast as a state of the art printing machine at 50% of the cost of the European manufactured machine. That printing machine will be producing POS material for consumption in Europe. It might even be providing material for our blessed Government. As was succinctly voiced by a civil servant only last week “If we have to take redundancies why shouldn’t industry suffer as well.” Now that is scary. Don’t worry Jon (Jon is the new editor) this is not going to turn into a rant so popular in this august journal in times past, it is just to put the interim upturn in perspective. Ladies and Gentlemen you are on your own! Your long-term success has to be built on top quality product, on time, at a price that makes you a reasonable profit. Your aim has to be continuous improvement. What can appear to be a rock solid market can disappear at the stroke of a bureaucrats’ pen. Life is getting more and more political and you know in politics it is the people on their own side they have to worry about not the opposition.

Printing is engineering and if you were brave enough to read last months’ article this is never truer than when Preventative Maintenance is part of the company operating systems. The interface between traditional engineering, the equipment and the process is obvious. It is once you get into the process itself that you realise that the same principles of measurement and control apply to the ink film as apply to the mechanics of the printing machine. In fact the need for managing the process is even more critical when it comes to creating a controlled ink film as compared to machining a drive shaft. Surprisingly enough they can both be affected by ambient conditions. The ink film to a large extent and machine tools to a far lesser degree. Not a lot of people know this but machine tools in a machine shop will move in sync with the heating effect of the sun as it moves across the sky. A common phenomenon in nature is mirrored in engineering as the expansion and contraction of the metal structure can cause from minute to significant variations in machining tolerances. No I haven’t been sniffing the solvents, a colleague did his PhD in just that topic. The screen printing equivalents are the Doctorates earned in the performance of the squeegee. It forces us to look at screen printing as something more than mere squeegee bashing.

One of my functions in business is to deliver NVQ’s to a range of different companies involved I screen printing. It is a big commitment but most enjoyable. Assessment and mentoring of people involved with screen printing gives an insight to the industry that is unique. The overwhelming impression is that screen printers are great people. With technology changing so fast it is easy to underestimate the capabilities of screen printing practitioners. One major attribute is experience often twenty years or more just a glance



at a print or a machine cycling and they know instinctively how to alter the print settings to achieve the desired effect. What is remarkable is the fact that the machine they are using is often knackered. It is still earning money for the company because of the skills of the printers not the suitability of the machine. Just think what they could do with a machine in good nick. Improve performance rather than keep it going. A firm foundation rather than a wing and a prayer. As management personnel changes the amount of expertise at a higher level within companies becomes diluted and these newer managers tend to keep away from the shop floor because they are effectively scared of the process and those screen printing leviathans that keep it running. To manage a facility you do not have to be a skilled printer but you do have to understand how the process works and be able to communicate effectively with your print team. The team can be a great help to you. They know which substrate runs through the machine most efficiently, the ink system that is most suited to their ambient conditions, the stencil system that gives the best results. Sometimes a cheaper alternative in other instances a more expensive option will reduce production costs significantly.

As far as stencil systems are concerned interesting issue that should be considered is whether to use capillary film or direct emulsion. The immediate reaction is capillary is far more expensive. When you compare material costs it certainly is, a metre square stencil would cost about £2.00 in direct liquid emulsion and up to £10.00 in capillary film. However material cost is only part of the equation. The first question is what quality do you wish to achieve. The pinnacle of graphics printing has to be ceramic transfer production up to twenty colours spot on registration and printing inks that are pretty abrasive. Capillary film is the material of choice. In other applications where fine lines and fine halftones have to be printed capillary films have held their own.



When printing fine lines and halftones Stencil Thickness also known as Emulsion Over Mesh is crucial, this is allied to Rz that is a measure of roughness of the stencil. Stencil Thickness in fine lines and halftones has a significant effect on the thickness of ink deposit. Normally it is the mesh that has the greatest effect on ink deposit but the stencil thickness governs the thickness of ink film up to 120 microns from the edge of the stencil. Therefore fine lines and tones are affected. The flatness of the stencil (Rz) controls the amount of ink that can flow outside the image area and effect edge definition. In an ideal stencil printing fine detail the stencil thickness should be a minimum, as should the Rz. The two don't naturally go together as a low EOM means that the chance of filling the mesh and producing a smooth surface is compromised. When using direct emulsion the method used of obtaining the desired combination is to coat wet on wet and then dry the stencil before coating again with a sharp coating trough to fill the hollows that would have caused a poor Rz. This is a time consuming process



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and although it is possible to do manually is impractical. You do need an automatic coating machine to do it properly.

Additional wet on dry coat fills undulations



Print Side

If you were to use the modern capillary films you could achieve the desired EOM and Rz more easily and faster. You cannot however use them with water-based inks. The decision is yours, however although a fan of high solids liquid emulsions I have just recommended a client to go the capillary film route in a start up situation. He wants to print line ruling around 100 lines per inch and he would rather not invest in an automatic coater. Fortunately he is starting from scratch so his stencil production unit will be spotless and he will keep it that way. For one thing is sure when using capillary film in producing the stencil you have to be scrupulously clean. Another myth about capillary film is that it is not very robust. Not so some time ago before the latest generation of films was available we printed more than 100,000 glass bottles off one stencil. That means the stencil material took some real hammer.

It is equally silly to state that you can't make a top quality stencil with direct liquid emulsion because you can and they can be fully water resistant. It just takes carefully controlled production techniques and the difference between the print off a well made stencil with direct liquid emulsion or one using capillary film is marginal. However the number of companies who are capable of producing top quality liquid coated stencils is limited. Which ever system results in reduced down time and reduced rejects is the one you should go for because one sheet of waste substrate can cost as much as the manufacturing cost of your stencil. As always the stencil is the foundation of the process get that right and you are off to a flying start.