PDS International Limited

CONTROLLING THE PRINT ROOM

Last month I discussed measurement and control in the Stencil Making Department, now we move on to the print room. The variations in working practices on the presses are even more numerous than in the stencil room. In some facilities there is a fear of process control an unwillingness to conform and almost a delight in fostering chaos. Possibly the psychology is if chaos rules then the incompetent can easily hide. That is somewhat uncharitable as there is also a perception that making lots of adjustments and being busy during a print run is demonstrating a willingness to work hard and being proficient. “Don’t worry the boys will get the job done.”

You may remember a comment in a previous article where a printer stated, “If only they would just let us get on and print, but they insist on us working to a Proof!!” You may think this is an exceptional case but unfortunately for those who have not accepted the principle of process control it is the norm. My flaxen hair partner on whom the nymphets of the article on Process Control in the Stencil room were modelled doesn’t believe in this psychologically gibberish that I go on about. She reckons it is because men won’t follow instructions and get bored if things are running smoothly. If I were to say that it would be called sexist. So I just told her not to worry her pretty little head about it and get on with girlie pursuits. The trouble is she may well be right.

Effective process control in the print room is so dependent on the quality of the stencil, the state of the ink, the integrity of the equipment and the condition of the substrate. Traditionally printers have developed techniques for dealing with the situation where some or all of these are compromised. Guaranteeing the quality of the stencil means that machine settings can be standardised. The aim is to achieve consistent results from batch to batch and consistent results during a run.

How you measure the results obtained depends on the market you are serving. In the graphics market it will be colour and dot gain/loss whereas industrial printers may be measuring conductivity or film thickness. Whatever your application measurement and control will improve efficiency, which means improvement in machine utilisation and elimination of rejects. Having achieved those two then look at increasing print rate.

Having each printer using the same methods of set up and operation of the equipment should be the rule. The reality is that each person often has their own techniques. This is a variable that is undesirable but unfortunately is accepted practice. If you were to attempt to run an injection moulding machine with settings that were the operators’ choice you would be a recipe for disaster, why we accept it in the screen printing industry is beyond me. If there was consistency companies like mine then could be employed in refining and developing the process rather than resuscitating it. At least it means I can afford some lard on my bread and in good months mucky fat. If you don’t know what that is you live south of Derby and you just haven’t lived.

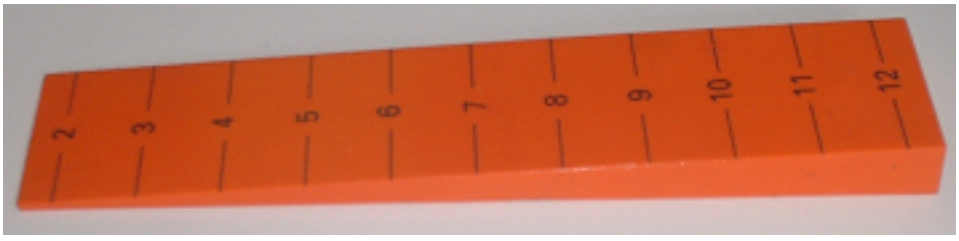
The by now well made stencil is mounted on the machine at a specific snap (off contact) distance. Invariably this distance is established by pressing down on the mesh to bring it into contact with the substrate. That is about as accurate as dropping a penny on the mesh to check its tension. Come on fellas take a risk and measure it!

There are three methods that I use. A steel rule, a snap wedge or the electronic probe. The snap is measured at four positions on the frame to ensure that the stencil is parallel to the substrate. Often we come across equipment where the snap distance is not only not measured but upon checking we find that there can be a variation of 3+ millimetres from one side of the frame to another. This isn't a twisted frame but the mounting is not parallel to the bed. This will result in distortion of the image, uneven ink deposits and damage to the stencil.

ELECTRONIC SNAP MEASUREMENT BY KIWO AND SPTF

The snap measurement probe was developed by SPTF in co-operation with KIWO it uses their thickness gauge instrument to give accurate snap measurement. The probe can be placed in different positions on the stencil to ensure that the snap distance is consistent.

SNAP MEASURING WEDGE SEFAR



Slid underneath the frame or clamping rails the Snap Wedge is a simple means of checking distance from machine bed. Straightforward calculation gives snap height.

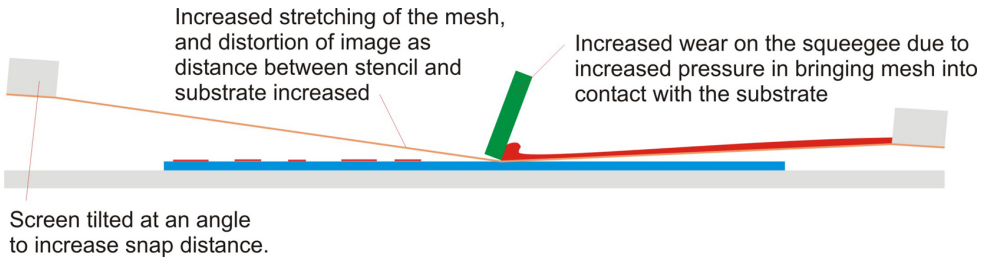
STEEL RULES B&Q

If you need instructions how to use these!

Some machines have a calibrated adjustment for snap distance that makes things a whole lot easier as long as they haven't been mangled over time. The chart below indicates the effects of not controlling snap distance.

Peel Off is another parameter that is oft abused. Some printers use it all the time, others intermittently. If you are printing close register work altering the peel off between passes will give you a variation in image size. For those who are unaware of this facility, as the squeegee traverses down the stencil the frame at the front lifts up to help the ink release from the mesh. If you have sufficient tension this is unnecessary and is considered bad practice, the effects are shown in the graphic.

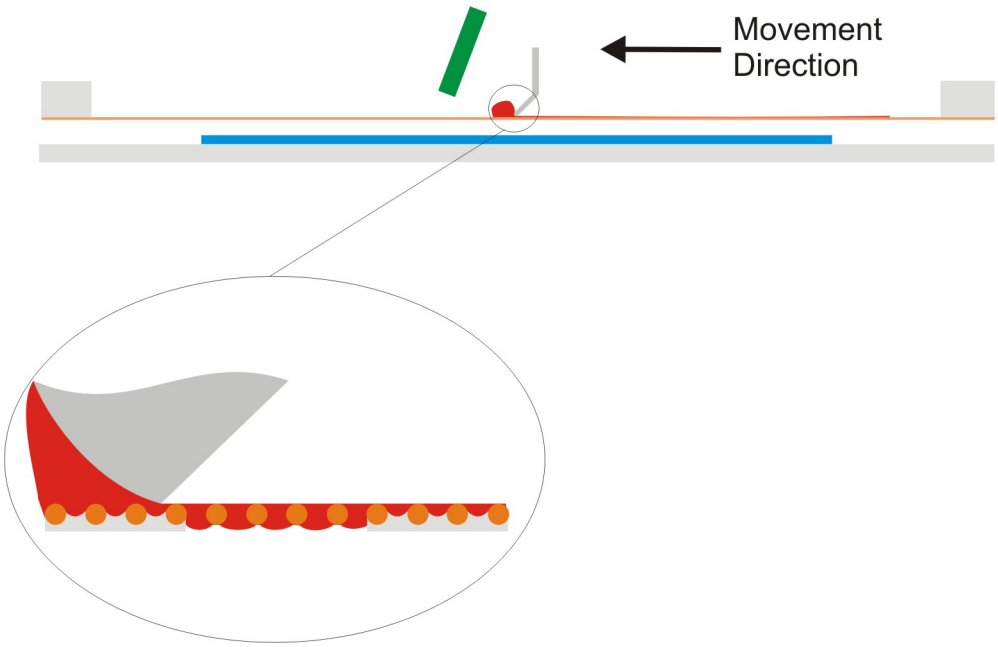
PEEL OFF



SETTING FLOOD COATER

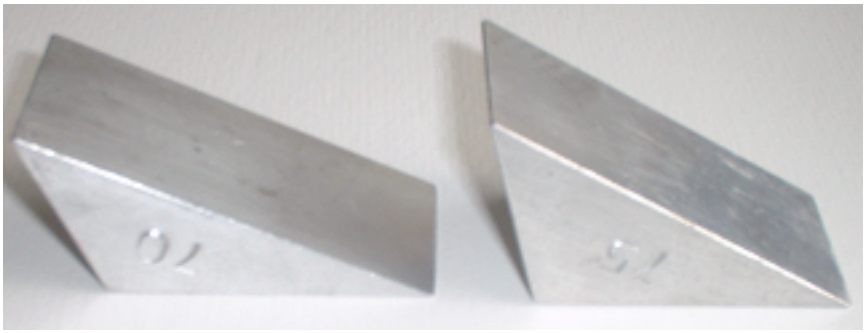
The flood coater has a significant effect on the amount of ink that passes through the mesh and it is often simply ignored. Although it is difficult to measure its set up the key aspect is the profile of the contact edge. This needs to be consistent and regularly checked for wear. The flood coater charges the mesh openings with ink before the squeegee causes the ink to flow through the mesh. A rounded flood coater will put more ink into the mesh than a sharp flood coater. There is a lot more to be said about the operation of the flood coater but this is not the time to enter that discussion.

ACTION OF FLOOD COATER



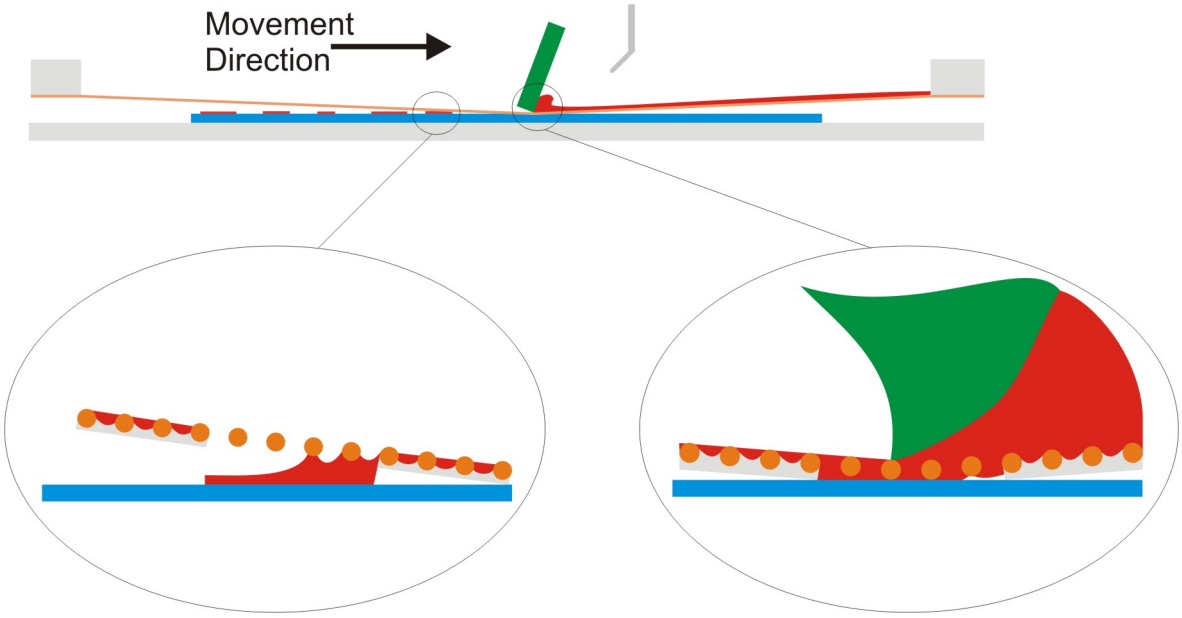
Setting the squeegee is about it being parallel with the substrate with sufficient pressure applied to bring the stencil into contact with the substrate and cause the ink to flow through the mesh. The measurements that are required are the set angle, the amount it protrudes from the squeegee holder and the actual squeegee hardness. If any of these are left to chance then control of the process is compromised.

BLOCKS FOR SETTING SQUEEGEE ANGLE



The squeegee is the engine of the process it provides the work to cause the ink to flow through the mesh. Mesh tension is the hidden energy that assists in efficient release of the ink from the mesh. These two forces combined influence the amount of ink that is metered through the mesh.

ACTION OF THE SQUEEGEE



MEASURING THE PRINTED DRY INK FILM.

This is measured in two conditions wet and dry. Normally it is in its dry condition that it is most critical.

For graphics it is either a straight case of measuring colour for which you are likely to use a spectrophotometer. If it is four colour process work then a densitometer is your chosen device. The difference is that a spectrophotometer gives readout of a colour within a chosen international colour model, L.a.b. and CIE are two such models. So it is possible specify a numerical value for a colour that, if instruments are calibrated, will give a very accurate colour specification. A densitometer is designed to measure the densities of simply the four process colours, Cyan, Process Yellow, Magenta and Process Black. A well as this it will indicate Dot Area, Dot Gain/Loss, Contrast, Trapping, Greyness. It is the Density and Dot Gain/Loss functions that are the most widely used in Screen Printing.

A factor to be taken into account is the measurement of dot size when the line ruling is low is less accurate than at higher line rulings. This due to the fact that he instrument samples as much of the image that its aperture will allow and basis its calculation on what it sees. Therefore a 4mm aperture will be more representative than a 2mm aperture at low line rulings.

The Densitometer is the most underused piece of equipment on the print floor, yet it is a vital tool in providing an objective indication of the performance of the process. Printers often prefer to estimate if the density is correct or the dot size has changed. A committed guesser stated he knew when the colour was right because it had “bollocks,” presumably meaning that it was of sufficient intensity. Then it would be true to say he

was talking bollocks. (Editor: Peter it may be in royal usage but I don't think you should use that word twice.)

Not using a densitometer would be like having an athletics competition without timing the races or measuring distances, world records and personal bests would be a matter of opinion. There would be no baseline of performance. How printing companies who claim to be graphics printers can operate without densitometers is a complete mystery to me. They certainly won't need a densitometer to see the red on their bank statements.

CHECKING IMAGE SIZE

For checking the size of images up to 1 metre is possible with a digital rule, alternatively the traditional method of comparing the print against the photopositive is fine as long as the photopositive is not subjected to large changes in humidity or temperature. The trick that some printers have of leaving the photopositive on top of the dryer is a recipe for disaster as the heat will dry it out and it will shrink.

Finally the dryer, if it is UV do check the output of the lamps? If it is hot air or infra-red do you check air flow and or temperature. Is it a press the button and hope form of measurement and control? There are devices for measuring all the parameters, dryer manufacturers will be happy to profile your dryers and recommend regular test programs. An inefficient dryer wastes energy, wrecks substrate, doesn't cure ink properly and slows production. Ignore it at your peril.

The application of effective measurement and control in the press-room will result in increased profits. None of it is complex it is simple common sense. Unless of course you don't think its necessary to use a densitometer in which case it is all…. (Editor: Peter! Oh no you don't not three times in the article!)