Its October already, we have become accustomed to working in the greenhouse conditions of summer but the chill of winter will soon be upon us. Don't worry I'm not going to start waxing lyrical about the early morning frost, but atmospheric conditions can have a considerable effect on what we print. Did you know that a change in humidity and temperature could alter the size of your photopositives? A 10% increase in humidity and a 5oC increase in temperature a 1-metre image will change by 230 microns or 0.230 mm.

If the image is wrong on the stencil you are never going to be able to produce the correct printed image. Over the years we have fought against image distortion caused by the vacuum blanket distorting the image during exposure. Missing print because of damaged photopositives. The wrong image when updates are not applied. Many of us have vast libraries of photopositives that never seem to hold the one we want when we want it. Then of course there the alterations, the patches, the overlays and the inevitable size nine-foot print on the only photopositive you have available.

An oft-ignored element of setting a machine is to position the photopositive accurately. The battered piece of card with pencilled positioning marks is generally the precision device for this purpose. Those who understand the importance of precise positioning in reducing machine set up times use a pin register system. (More about this in a future article.)

In a digital world the analogue stencil is the main inhibiting factor in the continued growth of the screen printing process. The ability to produce variable images is still a dream but Computer To Screen (CTS) is a very creditable step on the road and it has been with us for some time but recent developments are bringing its adoption to a larger market. It is not a "cheap" option but is often cost effective. Photopositives are increasingly expensive to manage, the effluent from processors prove challenging to dispose of correctly add these costs to downtime and rejects caused by inadequate quality and handling of photopositives and you will be surprised how much easier it is to build a business case for Computer To Screen technology. There are other gains to be made that will be addressed later.

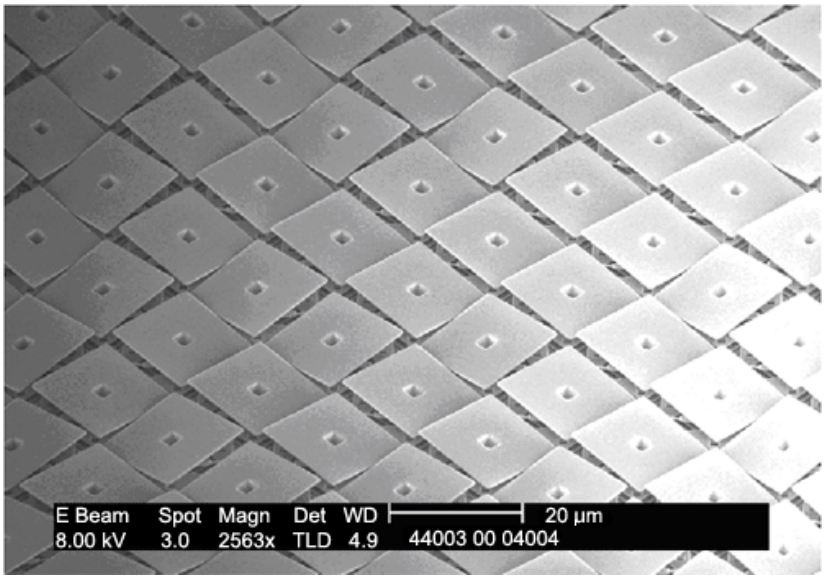
Computer to Screen has come in several forms. Initially a screen coated with emulsion had an image printed onto it with either ink or thermal wax using a piezo digital printing head. The effect of this was to remove the need for photopositives and ensure that there was no undercutting when the imaged screen was exposed. This can occur if a photopositive is not in intimate contact with the emulsion. These CTS techniques were and are suitable for many applications typically 85 lines per inch for the thermal wax method and up to 120 l.p.i. for the ink method. For users of large numbers of photopositives savings in the production of photopositives give a fast return on capital. The systems also enable the image to be accurately positioned on the stencil this reduces set up times. The limitation in resolution of the image printed onto the coated screen meant that the finest applications were beyond the scope of these image-printing systems. Another huge advantage was to be able to easily make changes to the design at the last minute. Digital proofing could show up an anomaly that was easily corrected. It was another step on the path of total digital workflow. For systems such as these it is

necessary to expose the coated mesh with the image printed on to it with UV light. There is no need to use a conventional printing down frame. The coated and imaged screens are simply exposed to UV light and there is no loss in definition due to undercutting. Exposure times are reduced because there is no glass in between the light source and the emulsion. If the emulsion has been previously dried sufficiently pinholes are a thing of the past. There is an issue with the cost of consumables. The well-tried thermal wax based systems are not cheap to operate because of the cost of the wax but the ink printed systems ink cost is less of an issue.

It was in the early to mid 1990's that Mografo A/S first attempted to image a stencil with a UV argon ion laser directly. It was based on the patented DISE3 Direct Laser Exposure System. The precision optical and mechanical systems were from Leica AG in Swizerland and Mografo developed the software. This was a valiant effort but in spite of being beta tested in the UK and Denmark it never came to market. The reasons for this are unclear but it may have had something to do with the fact that is was aimed at the large format market and speed would have been an issue. Nowadays technology has improved dramatically and the most likely techniques to fulfil the needs of the market are the SEFAR approach of a guided laser or the CST, KIWO and Signtronic approach of focussed UV light as prices come down. Luscher famous for its widely used thermal wax printing system looks to be moving into direct exposure but what system they will use is unclear.

Where focussed UV light is used rather than a UV laser the heart of these direct exposure systems is a Digital Micromirror Device or DLP® chip. Texas Instruments TM developed this component in 1987. The DLP® Digital Light Processing™ technology chip is probably the world's most sophisticated light switch.

Mirrors on DLP® Chip



Courtesy of Texas Instruments

It contains a rectangular array of up to 2 million hinge-mounted microscopic mirrors; each of these micromirrors measures less than one-fifth the width of a human hair. Used extensively in High Definition Television and Projection systems. The chip is used as a means of focussing Ultra Violet Light via a lens. This gives an imaging rate of up to 280 square feet per hour depending on the resolution. Stencil exposure is one of many of the adaptations of this technology. Since its invention the chip has proved to be extremely reliable.

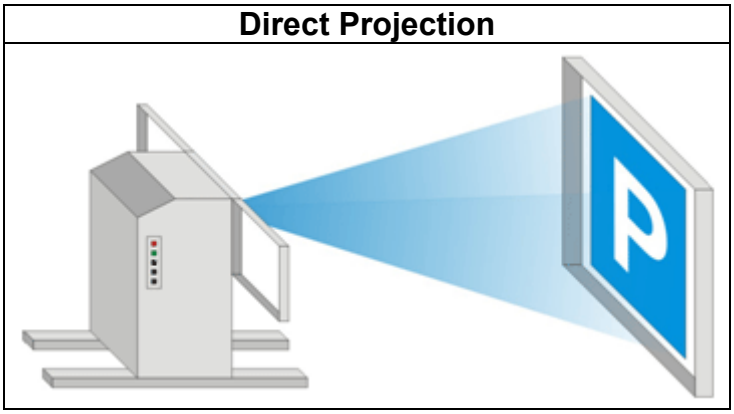
A UV Laser exposure system has been introduced by SEFAR. It is targeted at the industrial market sector and is capable of imaging an area of small format screens. This system does not use the Digital Micromirror Device or DLP® chip to focus the UV but it has a guided laser as the exposure tool. Precise performance details are not yet available but it is likely to be in line with the focussed UV system.

SEFAR LDS

Courtesy of SEFAR

These systems are unable to match the speed of Direct Projection at 18 large format frames per hour. Direct Projection is where a small (approximately A4) photopositive is produced on a high-resolution image setter and the photopositive placed in a projector with a UV light source. The image is projected onto a large format coated mesh to the desired magnification. The mesh that is normally white is coated with a very sensitive emulsion. The low level UV light projected onto the surface cures the emulsion and the stencil is developed in the normal way.

Direct Projection



It is interesting to see that Proditec who have been selling their PROKA cameras for many years are now incorporating the Signtronic CTS system into their automation system. This means that 150 lpi is now attainable as compared to the 50 lpi that is the norm, although higher is possible, for direct projection. The Signtronic system will not yet reach the production speeds of 18 large format frames per hour of the direct projection cameras but the 28 m2 per hour still gives a reasonable throughput for high-resolution stencils.

What is particularly interesting about these developments is that the bedrock suppliers of screen printing technology are becoming heavily involved in the use of digital technology to develop the screen printing process. Let us hope that this continues and that the industry supports these developments. For the screen printing process to maintain its integrity continuous development is essential. It is easy for industry to cast screen printing aside because of the apparent omnipotence of digital printing. This would be a big mistake babies and bathwater come to mind. Success is in synergy not separation.